

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

Adoption of Chapter 3-180
Hawaii Administrative Rules

October 13, 2009

SUMMARY

1. Chapter 180 of Title 3, Hawaii Administrative Rules, entitled "State Building Code", is adopted.

HAWAII ADMINISTRATIVE RULES

TITLE 3

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

SUBTITLE 14

STATE BUILDING CODE COUNCIL

CHAPTER 180

STATE BUILDING CODE

Subchapter 1 Rules of General Applicability

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SUBCHAPTER 1

RULES OF GENERAL APPLICABILITY

§3-180-1 Purpose. The purpose of this chapter is to adopt the state building code as required by section 107-25, HRS. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-2 Scope. This chapter sets forth minimum requirements for the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure or any appurtenances connected or attached to buildings or structures. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-3 Definitions. In this chapter, unless the context otherwise requires:

"Chapter" means this chapter.

"IBC" means the ICC, *International Building Code*, 2006 edition, as copyrighted by the International Code Council.

"ICC" means the International Code Council.

"Section" means a section of a chapter of the *International Building Code*.

"Table" means a table in this chapter. [Eff

APR 16 2010] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-4 Adoption of the International Building Code.

The "*International Building Code, 2006 Edition*" as copyrighted and published in 2006 by International Code Council, Incorporated, 500 New Jersey Avenue, 6th Floor, Washington, DC 20001, is adopted by reference and made a part of this chapter. This incorporation by reference includes all parts of the *International Building Code* subject to the amendments in this chapter. The appendices of the ICC, IBC are not adopted except as provided in this chapter. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-5

§3-180-5 Permit authorization. Each county of the State of Hawaii may, by ordinance, require that a permit be obtained from the building official for any area regulated by this chapter. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

SUBCHAPTER 2

AMENDMENTS TO THE 2006 ICC, INTERNATIONAL BUILDING CODE

§3-180-6 Title and purpose. Section 101.1 is amended to read as follows:

"101.1 Title. These regulations shall be known as the Building Code of the State of Hawaii, hereinafter referred to as "this code"." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-7 Scope. Section 101.2 is amended to read as follows:

"101.2 Scope. The provisions of this code shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height with a separate means of egress and their accessory structures shall be permitted to comply with the International Residential Code, if adopted by the county jurisdiction.
2. Existing State-owned buildings undergoing repair, alterations or additions and change of occupancy shall be permitted to comply with the International Existing Building Code, provided the extent of work does not exceed 50 per cent of the appraised value of the building." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-8 Appendices. Section 101.2.1 is amended to

read as follows:

"101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted.

Exceptions:

1. Appendix U, Hawaii Hurricane Sheltering Provisions for New Construction, shall be adopted.
2. Appendix W, Hawaii Wind Design Provisions for New Construction, shall be adopted.
3. Appendix X, Hawaii Provisions for Indigenous Hawaiian Architecture Structures, shall be adopted." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-9 Referenced codes. Section 101.4 is amended to read as follows:

"101.4 Referenced codes. The other codes referenced elsewhere in this code shall be considered guidelines of this code to the prescribed extent of each such reference.

101.4.1 Conflicts with other codes. If a referenced code conflicts with another applicable law of the jurisdiction, then said applicable law shall prevail over the guideline in the referenced code.

101.4.2 Fire prevention. Wherever the provisions of the *International Fire Code* are referenced, the *International Fire Code* shall apply to matters affecting or relating to structures, processes, and premises from the hazard of fire and explosion arising from the storage, handling, or use of structures, materials, or devices; from conditions hazardous to life, property, or public welfare in the occupancy of structures or premises; and from the construction, extension, repair, alteration, or removal of fire suppression and alarm systems or fire hazards in the structure or on the premises from occupancy or operation." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-10 Existing structures. Section 102.6 is amended to read as follows:

"102.6 Existing structures. Buildings in existence at the effective date of this code may have their existing use or occupancy continued if such use or occupancy was legal at the effective date of this code, provided the continued use does not constitute a hazard to the general safety and welfare of the occupants and the public." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-11

§3-180-11 Department of building safety. Section 103 is deleted in its entirety. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-12 Permits. Section 105 is deleted in its entirety. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-13 Construction documents. Section 106 is deleted in its entirety. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-14 Temporary structures and uses. Section 107 is deleted in its entirety. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-15 Fees. Section 108 is deleted in its entirety. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-16 Fire code defined. Section 202 is amended by adding the definition of "fire code" as follows:

"**FIRE CODE.** The state fire code as adopted by the state fire council." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-17 Group I-1. Section 308.2 is amended to read as follows:

"**308.2 Group I-1.** This occupancy shall include buildings, structures or parts thereof housing more than 16 persons, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment that provides personal care services in an assisted living facility. The residents participate in fire drills, are self starting, and may require some physical assistance from up to one staff to reach a point of safety in an emergency situation. Facilities with residents who require assistance by more than one staff, are not self starting, are bedridden beyond 14 days, or require intermittent nursing care beyond 45

days, shall reside on the first floor in all Type III, IV, and V construction, or shall be classified as Group I-2.

A facility such as the above with five or fewer persons shall be classified as a Group R-3 or shall comply with the International Residential Code in accordance with Section 101.2. A facility such as above, housing at least six and not more than 16 persons, shall be classified as Group R-4." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-18 Group I-2. Section 308.3 is amended to read as follows:

"308.3 Group I-2. This occupancy shall include buildings and structures used for personal, medical, surgical, psychiatric, nursing, or custodial care on a 24-hour basis of more than five persons who are not capable of self-preservation. This group shall include, but not be limited to, the following:

- Hospitals
- Nursing homes (both intermediate-care facilities and skilled nursing facilities)
- Mental hospitals
- Detoxification facilities
- Specialized alzheimer's facilities or areas
- Assisted living facilities (with residents beyond group I-1 limitations for capability)

A facility such as the above with five or fewer persons shall be classified as Group R-3 or shall comply with the International Residential Code in accordance with Section 101.2." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-19 Residential Group R. Section 310.1 is amended to read as follows:

"310.1 Residential Group R. Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I. Residential occupancies shall include the following:

R-1 Residential occupancies where the occupants are primarily transient in nature, including:

- Boarding houses (transient)
- Hotels (transient)

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Motels (transient)

R-2 Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, and facilities providing personal care services that have residents that are capable of self evacuation in an emergency situation, including:

Apartment houses

Boarding houses (not transient)

Convents

Dormitories

Facilities providing personal care services (with residents that are capable of self evacuation)

Fraternities and sororities

Hotels (nontransient)

Monasteries

Motels (nontransient)

Vacation timeshare properties

Facilities providing personal care services with 16 or fewer occupants are permitted to comply with the construction requirements for Group R-3.

R-3 Residential occupancies where the occupants are primarily permanent in nature and not classified as R-1, R-2, R-4 or I including:

Buildings that do not contain more than two dwelling units

Adult facilities that provide accommodations for five or fewer persons of any age for less than 24 hours

Child care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours

Congregate living facilities with 16 or fewer persons

Adult and child care facilities that are within a single-family home are permitted to comply with the International Residential Code in accordance with Section 101.2.

R-4 Residential occupancies shall include buildings, arranged for occupancy as assisted living facilities including more than five but not more than 16 occupants, excluding staff. Residents shall meet the ability to evacuate requirements and other limitations as required in Group I-1.

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3 except as otherwise provided for in this code, or shall comply with the International Residential Code." [Eff APR 16 2010]
(Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-20 Personal care service defined. The definition of "personal care service" in Section 310.2 is amended to read as follows:

"PERSONAL CARE SERVICE. The care of residents who do not require chronic or convalescent, health, medical or nursing care. Personal care involves responsibility for the safety of the resident while inside the building. The types of facilities providing personal care services shall include, but not be limited to, the following: assisted living facilities, residential care facilities, halfway houses, group homes, congregate care facilities, social rehabilitation facilities, alcohol and drug abuse centers and convalescent facilities." [Eff APR 16 2010]
(Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-21 Assisted living facilities defined. The definition of "assisted living facilities" in Section 310.2 is amended to read as follows:

"ASSISTED LIVING FACILITIES. A building or part thereof housing persons, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment which provides personal care services and are licensed by the State." [Eff APR 16 2010] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-22 Fire command station. Section 403.8 is amended to read as follows:

"403.8 Fire command station. Fire command stations shall comply with the fire code and be approved by the fire chief." [Eff APR 16 2010] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-23 Group I-1 assisted living facilities. Section 419.4 is added to read as follows:

"419.4 Group I-1 assisted living facilities. Group I-1

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assisted living facilities shall comply with the provisions of Sections 419.4.1 and 419.4.2.

419.4.1 Building story limitations. Buildings shall not exceed one story in Type VB construction, two stories in Types IIB, III, IV, and VA construction, and three stories in Type IIA construction, including any allowable automatic sprinkler increases. Other construction type limitations on stories shall be limited by the provisions of Chapter 5.

419.4.2 Group I-1 smoke barriers. Group I-1 occupancies shall be provided with at least one smoke barrier in accordance with Section 709. Smoke barriers shall subdivide every story used by residents for sleeping or treatment into at least two smoke compartments. Each compartment shall have not more than 16 sleeping rooms, and the travel distance from any point in a smoke compartment to a smoke barrier door shall not exceed 150 feet (45 720 mm). At least 10 square feet (0.93 m²) of refuge area per resident shall be provided within the aggregate area of corridors, treatment rooms, or other low hazard common space rooms on each side of each smoke barrier." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-24 Group I. Section 903.2.5 is amended to read as follows:

"903.2.5 Group I. An automatic sprinkler system shall be provided throughout buildings with Group I fire area." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-25 Group R. Section 903.2.7 is amended to read as follows:

"903.2.7 Group R. An automatic sprinkler system installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R fire area.

Exception: R-3 residential occupancies." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-26 Features. Section 911.1 is amended to read as follows:

"911.1 Features. Where required by other sections of this code, a fire command center for fire department operations shall be provided and shall comply with the

fire code and be approved by the fire chief."

[Eff **APR 16 2010**] (Auth: HRS §107-29)
(Imp: HRS §§107-24, 107-25)

S3-180-27 Gates. Section 1008.2 is amended to read as follows:

"1008.2 Gates. Gates serving the means of egress system shall comply with the requirements of this section. Gates used as a component in a means of egress shall conform to the applicable requirements for doors.

Exceptions:

1. Horizontal sliding or swinging gates exceeding the 4-foot (1219 mm) maximum leaf width limitation are permitted in fences and walls surrounding a stadium.
2. Security gates may be permitted across corridors or passageways in school buildings if there is a readily visible durable sign on or adjacent to the gate, stating 'THIS GATE IS TO REMAIN SECURED IN THE OPEN POSITION WHENEVER THIS BUILDING IS IN USE'. The sign shall be in letters not less than one inch high on a contrasting background. The use of this exception may be revoked by the building official for due cause." [Eff **APR 16 2010**]
(Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-28 Accessibility. Chapter 11 is deleted in its entirety and replaced to read as follows:

"Chapter 11 - Accessibility

1101 Scope. Buildings or portions of buildings shall be accessible to persons with disabilities in accordance with the following regulations:

1. For construction of buildings or facilities of the state and county governments, compliance with Section 103-50, HRS, administered by the Disability and Communication Access Board, State of Hawaii.
2. Americans with Disabilities Act, administered and enforced by the U.S. Department of Justice.
3. Fair Housing Act, administered and enforced by the U.S. Department of Housing and Urban Development.
4. Other pertinent laws relating with disabilities shall be administered and enforced by agencies responsible for their enforcement.

Prior to the issuance of a building permit, the owner (or

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the owner's representative, professional architect, or engineer), shall submit a statement that all requirements, relating to accessibility for persons with disabilities, shall be complied with." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

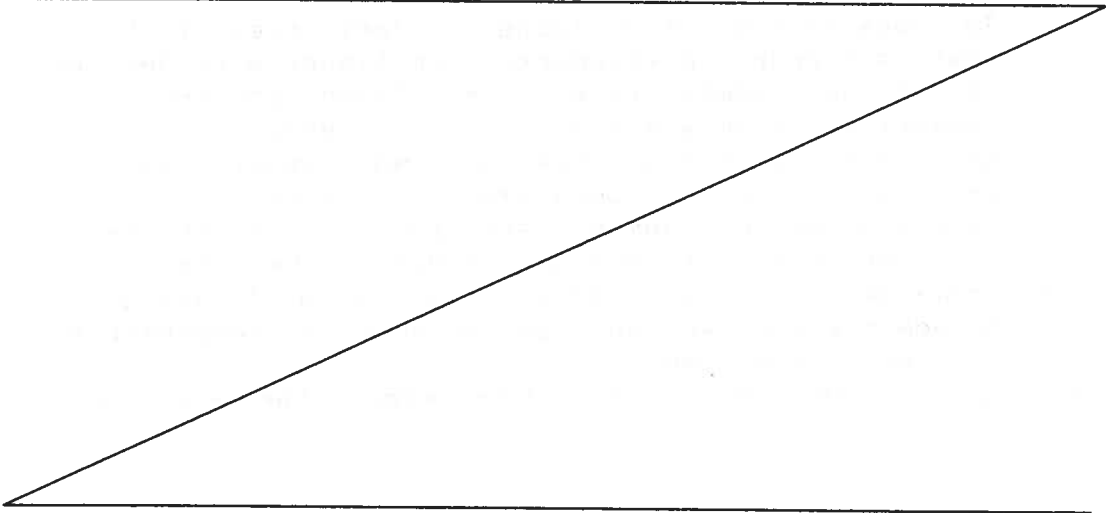
S3-180-29 Unvented attic spaces. Section 1203.2.2 is added to read as follows:

"1203.2.2 Unvented attic spaces. The attic space shall be permitted to be unvented when the design professional determines it would be beneficial to eliminate ventilation openings to reduce salt-laden air and maintain relative humidity 60 per cent or lower to:

1. Avoid corrosion to steel components,
2. Avoid moisture condensation in the attic space, or
3. Minimize energy consumption for air conditioning or ventilation by maintaining satisfactory space conditions in both the attic and occupied space below." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-30 Live loads posted. Section 1603.3 is amended to read as follows:

"1603.3 Live loads posted. Where the live loads for which each floor or portion thereof of a commercial or industrial building is or has been designed to exceed 100 psf (4.80 kN/m²), such design live loads shall be conspicuously posted by the owner in that part of each story in which they apply, using durable signs. It shall be unlawful to remove or deface such notices." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)



§3-180-31 Seismic design - short term. Table 1613.5.6(1) is amended to read as follows:

"Table 1613.5.6(1)

Seismic Design Category Based On Short-Period Response Acceleration

Value of S_{DS}	Occupancy Category		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50 \leq S_{DS} < 0.60g$	C	D	D
$0.60g \leq S_{DS}$	D	D	D

[Eff APR 16 2010] (Auth: HRS §107-29)
(Imp: HRS §§107-24, 107-25)

§3-180-32 Seismic design - 1-second period. Table 1613.5.6(2) is amended to read as follows:

"Table 1613.5.6(2)

Seismic Design Category Based On 1-Second Period Response Acceleration

Value of S_{DI}	Occupancy Category		
	I or II	III	IV
$S_{DI} < 0.067g$	A	A	A
$0.067g \leq S_{DI} < 0.133g$	B	B	C
$0.133g \leq S_{DI} < 0.20g$	C	C	D
$0.20g \leq S_{DI} < 0.25g$	C	D	D
$0.25g \leq S_{DI}$	D	D	D

[Eff APR 16 2010] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-33 Design rain loads. Section 1611.1 is amended to read as follows:

"1611.1 Design rain loads. Each portion of a roof shall be designed to sustain the load of rainwater that will accumulate on it if the primary drainage system for that portion is blocked plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow. The design rainfall rate shall be based on the 100-year 1-hour rainfall rate indicated in Figure 1611.1 as published by the National Weather Service

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or on other rainfall rates determined from approved local weather data.

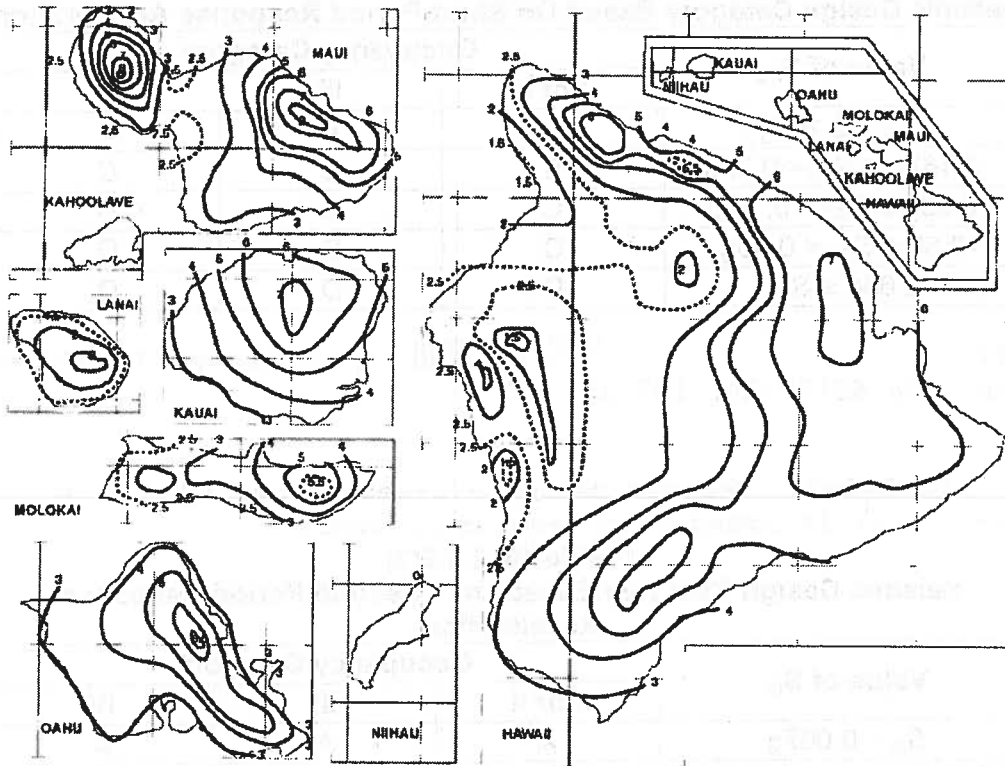


Figure 1611.1

100-Year, 1-Hour Rainfall (inches) Hawaii

For SI: 1 inch = 25.4 mm.

Source: National Weather Service, national Oceanic and Atmospheric Administration, Washington D.C."

[Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-34 Structural observation defined. The definition of "structural observation" in Section 1702 is amended to read as follows:

"STRUCTURAL OBSERVATION. Structural observation is as defined in chapter 16-115, Hawaii Administrative Rules, implementing chapter 464, Hawaii Revised Statutes. Structural observation does not include or waive the responsibility for the inspection required by Section 109, 1704 or other sections of this code." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-35 General. Section 1704.1 is amended to read as follows:

"1704.1 General. Where application is made for construction as described in this section, the owner or the registered design professional in responsible charge acting as the owner's agent shall employ one or more special inspectors to provide inspections during construction on the types of work listed under Sections 1704 and 1707. The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the building official, for inspection of the particular type of construction or operation requiring special inspection. These inspections are in addition to the inspections specified in Section 109.

Exceptions:

1. Special inspections are not required for work of a minor nature or as warranted by conditions in the jurisdiction as approved by the building official.
2. Special inspections are not required for building components unless the design involves the practice of professional engineering or architecture as defined by applicable state statutes and regulations governing the professional registration and certification of engineers or architects.
3. Unless otherwise required by the building official, special inspections are not required for occupancies in Group R-3 as applicable in Section 101.2 and occupancies in Group U that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-36 Statement of special inspections. Section 1704.1.1 is amended to read as follows:

"1704.1.1 Statement of special inspections. The construction drawings shall include a complete list of special inspections required in Sections 1704, 1707 and 1708." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-37 Report requirement. Section 1704.1.2 is amended to read as follows:

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"1704.1.2 Report requirement. Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the owner and licensed engineer or architect of record. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction, then, if uncorrected, to the licensed engineer or architect of record and to the building official. The special inspector shall submit a final signed report to the owner and licensed engineer or architect of record, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of this code. Prior to the final inspection required under Section 109.3.10, the licensed engineer or architect of record shall submit a written statement verifying receipt of the final special inspection reports and documenting that there are no known unresolved code requirements that create significant public safety deficiencies." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-38 Statement of special inspections. Section 1705 is deleted in its entirety. [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-39 Structural observations. Section 1709 is amended to read as follows:

"1709 Structural observations. Structural observations shall be performed in accordance with Section 464-5, Hawaii Revised Statutes, administered and enforced by the Department of Commerce and Consumer Affairs." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-40 Splices. Section 1808.2.7 is amended to read as follows:

"1808.2.7 Splices. Splices shall be constructed so as to provide and maintain true alignment and position of the component parts of the pier or pile during installation and subsequent thereto and shall be of adequate strength to transmit the vertical and lateral loads and moments

occurring at the location of the splice during driving and under service loading. Splices occurring in the upper 10 feet (3048 mm) of the embedded portion of the pier or pile shall be capable of resisting at allowable working stresses the moment and shear that would result from an assumed eccentricity of the pier or pile load of 3 inches (76 mm), or the pier or pile shall be braced in accordance with Section 1808.2.5 to other piers or piles that do not have splices in the upper 10 feet (3048 mm) of embedment."

[Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-41 Cleanouts. Section 2104.1.9 is added to read as follows:

"2104.1.9 Cleanouts. Cleanouts shall be provided for all grout pours over 5 feet 4 inches in height. Special provisions shall be made to keep the bottom and sides of the grout spaces, as well as the minimum total clear area required by ACI 530.1-05/ASCE 6-05/TMS 602-05 clean and clear prior to grouting.

Exception: Cleanouts are not required for grout pours 8 feet or less in height providing all of the following conditions are met:

1. The hollow masonry unit is 8-inch nominal width or greater with specified compressive strength f_m less than or equal to 1,500 psi;
 2. Fine grout is used complying with ASTM C-476 minimum compressive strength of 2,500 psi; and
 3. Special Inspection is provided." [Eff **APR 16 2010**]
- (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-42 Preservative-treated wood. Section 2303.1.8 is amended to read as follows:

"2303.1.8 Preservative-treated wood. Structural lumber, including plywood, posts, beams, rafters, joists, trusses, studs, plates, sills, sleepers, roof and floor sheathing, flooring and headers of new wood-frame buildings and additions shall be:

1. Treated in accordance with AWPA Standard U1 (UC1 thru UC4B) for AWPA Standardized Preservatives, all marked or branded and monitored by an approving agency. Incising is not required, providing that the retention and penetration requirements of these standards are met.

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2. For SBX disodium octaborate tetrahydrate (DOT), retention shall be not less than 0.28 pcf B_2O_3 (0.42 pcf DOT) for exposure to Formosan termites. All such lumber shall be protected from direct weather exposure as directed in AWPAC UC1 and UC2.
3. For structural glue-laminated members made up of dimensional lumber, engineered wood products, or structural composite lumber, pressure treated in accordance with AWPAC U1 (UC1 thru UC4B) or by Light Oil Solvent Preservative (LOSP) treatment standard as approved by the building official. Water based treatment processes as listed in paragraphs 1 and 2 are not allowed to be used on these products unless specified by a structural engineer for use with reduced load values and permitted by the product manufacturer.
4. For structural composite wood products, treated by non-pressure processes in accordance with AWPAC Standard U1 (UC1, UC2 and UC3A) or approved by the building official.

2303.1.8.1 Treatment. Wood treatment shall include the following:

1. A quality control and inspection program which meets or exceeds the current requirements of AWPAC Standards M2-01 and M3-03;
2. Inspection and testing for the treatment standards as adopted by this code shall be by an independent agency approved by the building official, accredited by the American Lumber Standards Committee (ALSC) and contracted by the treating company;
3. Field protection of all cut surfaces with a preservative, which shall be applied in accordance with AWPAC Standard M-4-02 or in accordance with the approved preservative manufacturer's ICC-Evaluation Services report requirements.

2303.1.8.2 Labeling. Labeling shall be applied to all structural lumber 2 inches or greater nominal thickness, with the following information provided on each piece as a permanent ink stamp on one face or on a durable tag permanently fastened to ends with the following information:

1. Name of treating facility;
2. Type of preservative;
3. AWPAC use category;
4. Quality mark of third party inspection agency;

6. Year of treatment.

All lumber less than 2 inches in nominal thickness, shall be identified per bundle by means of a label consisting of the above requirements. Labels measuring no less than 6 inches by 8 inches shall be placed on the lower left corner of the strapped bundle.

2303.1.8.3 Moisture content of treated wood. When wood pressure treated with a water-borne preservative is used in enclosed locations where drying in service cannot readily occur, such wood shall be at a moisture content of 19 percent or less before being covered with insulation, interior wall finish, floor covering or other material." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-43 Fasteners in non-borate-preservative-treated and fire-retardant-treated wood. Section 2304.9.5 is amended to read as follows:

"2304.9.5 Fasteners in non-borate-preservative-treated and fire-retardant-treated wood. Fasteners for preservative-treated and fire-retardant-treated wood, other than Borate (SBX, ZB) or LOSP treatments as approved in Section 2303.1.8 Preservative-treated wood, shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicone bronze or copper. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A 153.

Exception: Fasteners other than nails, timber rivets, wood screws and lag screws shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

Fastenings for wood foundations shall be as required in AF&PA Technical Report No. 7." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-44 Protection against decay and termites. Section 2304.11 is amended to read as follows:

"2304.11 Protection against decay and termites.

2304.11.1 General. Where required by this section, protection from decay and termites shall be provided by the use of naturally durable or preservative-treated wood.

2304.11.2 Wood used above ground. Structural lumber installed above ground shall be preservative-treated wood in accordance with Section 2303.1.8.

2304.11.2.1 Soil treatment and termite barriers. Where structural lumber of wood frame buildings or structures are supported directly on the ground by a concrete slab, or concrete and/or masonry foundation, Formosan subterranean termite protection shall be provided by either chemically treating the soil beneath and adjacent to the building or structure by a Hawaii-licensed pest control operator, or stainless steel termite barrier, or other termite protection measures approved by the building official.

All soil treatment, stainless steel termite barrier, and termite protection measures shall be installed according to manufacturer's recommendations for control of Formosan subterranean termites.

2303.11.3 Wood in ground contact. Wood supporting permanent buildings and structures, which is in direct soil contact or is embedded in concrete or masonry in direct contact with earth shall be treated to the appropriate commodity specification of AWPA Standard U1.

Wood in direct soil contact but not supporting any permanent buildings or structures shall be treated to the appropriate commodity specification of AWPA Standard U1 for ground contact.

2304.11.4 Retaining walls. Wood in retaining or crib wall shall be treated to AWPA Standard U1.

2304.11.5 Wood and earth separation. Where wood is used with less than 6-inch vertical separation from earth (finish grade), the wood shall be treated for ground-contact use.

Where planter boxes are installed adjacent to wood frame walls, a 2-inch-wide (51 mm) air space shall be provided between the planter and the wall. Flashings shall be installed when the air space is less than 6 inches (152 mm) in width. Where flashing is used, provisions shall be made to permit circulation of air in the air space. The wood-frame wall shall be provided with an exterior wall covering conforming to the provisions of section 2304.6.

2304.11.6 Under-floor clearance for access and inspection. Minimum clearance between the bottom of floor joists or bottom of floors without joists and the ground beneath shall be 24 inches; the minimum clearance between the bottom of girders and the ground beneath shall be 18 inches.

Exception: Open slat wood decks shall have ground clearance of at least 6 inches for any wood member.

Accessible under-floor areas shall be provided with a minimum 18 inch-by 24 inch access opening, effectively screened or covered. Pipes, ducts and other construction shall not interfere with the accessibility to or within under-floor areas.

2304.11.7 Wood used in retaining walls and cribs. Wood installed in retaining or crib walls shall be preservative treated in accordance with AWPA U1 (Commodity Specifications A or F) for soil and fresh water use.

2304.11.8 Weather exposure. All portions of timbers (over 5-inch nominal width) and glued-laminated timbers that form structural supports of a building or other structure shall be protected by a roof, eave, overhangs, flashings, or similar coverings.

All wood or wood composite panels, in weather-exposed applications, shall be of exterior type.

2304.11.9 Water splash. Where wood-frame walls and partitions are covered on the interior with plaster, tile or similar materials and are subject to water splash, the framing shall be protected with approved waterproof paper conforming to Section 1404.2.

2304.11.10 Pipe and other penetrations. Insulations around plumbing pipes shall not pass through ground floor slabs. Openings around pipes or similar penetrations in a concrete or masonry slab, which is in direct contact with earth, shall be filled with non-shrink grout, BTB, or other approved physical barrier." [Eff
(Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

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S3-180-45 General. Section 2308.1 is amended to read as follows:

"2308.1 General. The requirements of this section are intended for conventional light-frame construction. Other methods are permitted to be used, provided a satisfactory design is submitted showing compliance with other provisions of this code. Interior nonload-bearing partitions, ceilings and curtain walls of conventional light-frame construction are not subject to the limitations of this section. Alternatively, compliance with AF&PA WFCM shall be permitted subject to the limitations therein and the limitations of this code." [Eff
(Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

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S3-180-46

S3-180-46 Scope. Section 2701.1 is amended to read as follows:

"2701.1 Scope. This chapter governs the electrical components, equipment and systems used in buildings and structures covered by this code. Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of the National Electrical Code, NFPA 70." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-47 Scope. Section 2901.1 is amended to read as follows:

"2901.1 Scope. The provisions of this chapter and the Uniform Plumbing Code shall govern the erection, installation, alteration, repairs, relocation, replacement, addition to, use, or maintenance of plumbing equipment and systems. Plumbing systems and equipment shall be constructed, installed, and maintained in accordance with the Uniform Plumbing Code and adopted amendments. Private sewage disposal systems shall conform to the International Private Sewage Disposal Code." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-48 Scope. Section 3001.1 is amended to read as follows:

"3001.1 Scope. This chapter shall be a guideline and governs the design, construction, installation, alteration, and repair of elevators and conveying systems and their components. If this chapter conflicts with another applicable law of the jurisdiction, then said applicable law shall prevail over this chapter." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-49 Public swimming pools. Section 3109.3 is amended to read as follows:

"3109.3 Public swimming pools. Public swimming pools shall be completely enclosed by a fence at least 4 feet (1290 mm) in height or a screen enclosure. Openings in the fence shall not permit the passage of a 4-inch-diameter (102 mm) sphere. The fence or screen enclosure shall be equipped with self-closing and self-latching gates.

Exception: Swimming, dipping, or wading pools located

on the premises of a hotel are not required to be enclosed." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-50 Conformance. Section 3405.1 is amended to read as follows:

"3405.1 Conformance. The installation or replacement of glass shall be as required by Chapter 24 for new installations." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-51 Compliance with other codes. Section 3410.3.2 is amended to read as follows:

"3410.3.2 Compliance with other codes. Buildings that are evaluated in accordance with this section shall comply with the state fire code." [Eff **APR 16 2010**] (Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

§3-180-52 Appendix U - Hawaii hurricane sheltering provisions for new construction. Appendix U is added to read as follows:

"APPENDIX U

Hawaii Hurricane Sheltering Provisions for New Construction

Section U101 Community storm shelters. Chapter 4 is amended by adding Section 421 to read as follows:

SECTION 421 Community storm shelters

421.1 General. In addition to other applicable requirements in this code, community storm shelters and the following specific Occupancy Category IV buildings shall be constructed in accordance with ICC/NSSA-500:

1. Designated earthquake, hurricane or other emergency shelters.
2. Designated emergency preparedness, communication, and operation centers and other facilities required for emergency response.

421.1.1 Scope. This appendix applies to the construction of storm shelters constructed as separate detached buildings or constructed as safe rooms within buildings for the purpose of providing safe refuge from storms that produce high winds, such as hurricanes. Such

structures shall be designated to be hurricane shelters.

421.2 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

COMMUNITY STORM SHELTER. A building, structure, or portion thereof, constructed in accordance with ICC 500-08 ICC/NSSA Standard on the Design and Construction of Storm Shelters and designated for use during a severe wind storm event such as a hurricane.

Section U102 Hawaii residential safe room. Chapter 4 is amended by adding Section 422 to read as follows:

SECTION 422 Hawaii residential safe room

422.1 Performance-based design criteria. The residential safe room shall meet the minimum performance specifications of Sections 422.1.1 through 422.9.

422.1.1 Intent and scope. The intent of the residential safe room is to temporarily provide an enhanced protection area, fully enclosed within a dwelling or within an accessory structure to a residence, which is designed and constructed to withstand the wind pressures, windborne debris impacts, and other requirements of this section.

422.1.2 Alternative standards.

1. Manufactured safe room designs subject to approval.

A manufactured safe room or safe room kit may be substituted if documentation is submitted and approved by the building official. The safe room shall be engineered, tested, and manufactured to meet or exceed the criteria of this section.

2. FEMA in-residence shelter designs permitted. It shall be permissible to build FEMA In-Residence Shelters of up to 64 square feet of floor area with walls up to 8 feet long that are built in accordance with construction details of FEMA 320.

422.2 Site criteria. Residential safe rooms shall not be constructed within areas subject to stream flooding, coastal flooding or dam failure inundation within any of the following areas:

1. FEMA Special Flood Hazard Areas (SFHA) subject to rainfall runoff flooding or stream or flash flooding;
2. Coastal zones "V" or "A" identified in the Flood Insurance Rate Map (FIRM) issued by FEMA for floodplain management purposes, in which the flood hazard are tides, storm surge, waves, tsunamis, or a combination of these hazards;
3. Areas subject to dam failure inundation as determined

by the Department of Land and Natural Resources.

422.3 Maximum occupancy. The safe room is permitted to be used for a maximum occupancy based on at least 15 square feet per person with a maximum of 8 persons in a room of up to 128 square feet of floor area.

422.4 Provisions for exiting. The room shall be equipped with an inward-swinging door and an impact-protected operable window suitable for a means of alternative exiting in an emergency.

422.5 Design for dead, live, wind, rain, and impact loads.

422.5.1 Structural integrity criteria.

1. The residential safe room shall be built with a complete structural system and a complete load path for vertical and lateral loads caused by gravity and wind.
2. The building that the residential safe room is in shall be assumed to be destroyed by the storm and shall not be taken as offering any protective shielding to the safe room enclosure.
3. The ceiling structure and wall shall be capable of supporting a superimposed debris load of the full weight of any building floors and roof above, but not less than 125 psf.
4. The residential safe room enclosure shall be capable of simultaneously resisting lateral and uplift wind pressures corresponding to a 160 mph 3-second peak gust, determined in accordance with ASCE 7, Minimum Design Loads for Buildings and Other Structures, calculated using load and importance Factors of 1.0. The site exposure factor shall be based on exposure C. The gust factor and the directionality factor shall be taken as 0.85. Topographic wind amplification caused by mountainous terrain shall be considered in accordance with the building code. Internal pressure shall be determined in accordance with ASCE 7.
5. The residential safe room shall be anchored to a foundation system capable of resisting the above loading conditions.

422.5.2 Windborne debris impact protection of building enclosure elements. The entire enclosure of the safe room, including all walls, ceilings, and openings, fixed or operable windows, and all entry doors into the safe room, shall meet or exceed Level D requirements of ASTM E 1996 (Table 422.5-1). Any wall or ceiling penetration greater

than 4 square inches shall be considered an opening.

Exception: Electrical outlet boxes and interior lighting switches not penetrating more than 2.5-inches into the interior wall surface and a plumbing piping or conduit not greater than 1.5-inch in diameter shall be exempted from this requirement.

422.5.3 Cyclic pressure loading of glazing and protective systems. Impact protective systems shall meet the ASTM E 1996 cyclic pressure requirement for the loading given in Table 422.5-1.

Table 422.5-1
Windborne Debris Protection and Cyclic Pressure Criteria for Residential Safe Rooms

ASTM E 1996 Missile Level Rating	Debris Missile Size	Debris Impact Speed	Enclosure Wall Ceiling, and Floor Cyclic Air Pressure Testing - maximum inward and maximum outward pressures
D	2 x 4 weighing 9.0 lb. +/- 0.25 lb., and with min. length 8 ft. +/- 4-inch	50 ft./sec. or at least 34 mph	35 psf inward 45 psf outward

422.6 Ventilation. The residential safe room shall be naturally ventilated to allow the enclosure to have approximately one air change every two hours. This requirement may be satisfied by 12 square inches of venting per occupant. There shall be at least two operable vents. The vents shall be protected by a cowling or other device that shall be impact tested to comply with ASTM E 1996 Level D. Alternatively, the room shall be evaluated to determine if the openings are of sufficient area to constitute an open or partially enclosed condition as defined in ASCE 7.

422.7 Communications. The residential safe room shall be equipped with a phone line and telephone that does not rely on a separate electrical power outlet. Alternatively, a wireless telephone shall be permitted to rely on an Uninterruptible Power Supply (UPS) battery device.

422.8 Construction documents. Construction documents for the residential safe room shall be directly prepared by a Hawaii-licensed professional structural engineer.

422.9 Special inspection. The construction or installation of the residential safe room shall be verified for conformance to the drawings in accordance with Chapter

17.

422.10 Notification. The owner of the residential safe room shall notify the state department of defense and county civil defense agency of the property's Tax map key or global positioning system coordinates.

Section U103 State- and County-owned public high occupancy buildings - design criteria for enhanced hurricane protection areas. Chapter 4 is amended by adding Section 423 to read as follows:

SECTION 423 State- and County-owned public high occupancy buildings - design criteria for enhanced hurricane protection areas

423.1 Intent. The purpose of this section is to establish minimum life safety design criteria for enhanced hurricane protection areas in high occupancy state- and county-owned buildings occupied during hurricanes of up to Saffir Simpson Category 3.

423.2 Scope. This section shall apply to state- and county-owned buildings which are of Occupancy Category III and IV defined by Table 1604.5 and of the following specific occupancies:

1. Enclosed and partially enclosed structures whose primary occupancy is public assembly with an occupant load greater than 300.
2. Health care facilities with an occupant load of 50 or more resident patients, but not having surgery or emergency treatment facilities.
3. Any other state- and county-owned enclosed or partially enclosed building with an occupant load greater than 5,000.
4. Hospitals and other health care facilities having surgery or emergency treatment facilities.

Exception: Facilities located within flood zone V and flood zone A that are designated by the owner to be evacuated during hurricane warnings declared by the National Weather Service, shall not be subject to these requirements.

423.3 Site criteria.

423.3.1 Flood and tsunami zones. Comply with ASCE 24-05, Flood Resistant Design and Construction, based on provisions for Occupancy Category III.

1. Floor slab on grade shall be 1.5 foot above the base flood elevation of the county's flood hazard map, or at higher elevation as determined by a

modeling methodology that predicts the maximum envelope and depth of inundation including the combined effects of storm surge and wave actions with respect to a Category 3 hurricane.

2. Locate outside of V and Coastal A flood zones unless justified by site-specific analysis or designed for vertical evacuation in accordance with a method approved by the building official. When a building within a V or Coastal A flood zone is approved, the bottom of the lowest structural framing member of any elevated first floor space shall be 2 feet above the base flood elevation of the county's flood hazard map, or at higher elevation as determined by a modeling methodology that predicts the maximum envelope and depth of inundation including the combined effects of storm surge and wave actions with respect to a Category 3 hurricane.
3. Locate outside of tsunami evacuation zones unless justified by site-specific analysis or designed for vertical evacuation in accordance with a method approved by the building official.

423.3.2 Emergency vehicle access. Provide at least one route for emergency vehicle access. The portion of the emergency route within the site shall be above the 100-year flood elevation.

423.3.3 Landscaping and utility laydown impact hazards. Landscaping around the building shall be designed to provide standoff separation sufficient to maintain emergency vehicle access in the event of mature tree blowdown. Trees shall not interfere with the functioning of overhead or underground utility lines, nor cause laydown or falling impact hazard to the building envelope or utility lines.

423.3.4 Adjacent buildings. The building shall not be located within 1,000 feet of any hazardous material facilities defined by Table 1604.5. Unanchored light-framed portable structures shall be not permitted within 300 feet of the building.

423.4 Enhanced hurricane protection area program requirements.

423.4.1 Applicable net area. At least 50 per cent of the net square feet of a facility shall be constructed to qualify as an enhanced hurricane protection area. The net floor area shall be determined by subtracting from the gross square feet the floor area of excluded spaces,

exterior walls, columns, fixed or movable objects, equipment or other features that under probable conditions cannot be removed or stored during use as a storm shelter.

423.4.2 Excluded spaces. Spaces such as mechanical rooms, electrical rooms, storage rooms, attic and crawl spaces, shall not be considered as net floor area permitted to be occupied during a hurricane.

423.4.3 Occupancy capacity. The occupancy capacity shall be determined by dividing the net area of the enhanced hurricane protection area by 15 square feet net floor area per person.

423.4.4 Toilets and hand washing facilities. Provide a minimum of 1 toilet per 50 enhanced hurricane protection area occupants and a minimum of 1 sink per 100 enhanced hurricane protection area occupants, as determined in accordance with Section 423.4.3, located within the perimeter of the enhanced hurricane protection area. These required toilet and hand-washing facilities are not in addition to those required for normal occupancy and shall be included in the overall facility fixture count.

423.4.5 Accessibility. Where the refuge occupancy accommodates more than 50 persons, provide an ADA-accessible route to a shelter area at each facility with a minimum of 1 wheelchair space for every 200 enhanced hurricane protection area occupants determined in accordance with Section 423.4.3.

423.5 Design wind, rain, and impact loads.

423.5.1 Structural design criteria. The building main wind force resisting system and structural components shall be designed per ASCE 7 for a 115 mph minimum peak 3-second gust design speed with a load factor of 1.6, and an importance factor for Occupancy Category III. Topographic and directionality factors shall be the site-specific values determined in accordance with Appendix W. Design for interior pressure shall be based on the largest opening in any exterior facade or roof surface.

423.5.2 Windborne debris missile impact for building enclosure elements. Exterior glazing and glazed openings, louvers, roof openings and doors shall be provided with windborne debris impact resistance or protection systems conforming to ASTM E1996-05 Level D, i.e., 9 lb., 2 X 4, @ 50 fps (34 mph).

423.5.3 Cyclic pressure loading of impact resistive glazing or windborne impact protective systems. Resistance to the calculated maximum inward and outward pressure shall be designed to conform to ASTM E1996-05.

423.5.4 Windows. All unprotected window assemblies and their anchoring systems shall be designed and installed to meet the wind load and missile impact criteria of this section.

423.5.5 Window protective systems. Windows may be provided with permanent or deployable protective systems, provided the protective system is designed and installed to meet the wind load and missile impact criteria and completely covers the window assembly and anchoring system.

423.5.6 Doors. All exterior and interior doors subject to possible wind exposure or missile impact shall have doors, frames, anchoring devices, and vision panels designed and installed to resist the wind load and missile impact criteria or such doors, frames, anchoring devices, and vision panels shall be provided with impact protective systems designed and installed to resist the wind load and missile impact criteria of this section.

423.5.7 Exterior envelope. The building enclosure, including walls, roofs, glazed openings, louvers and doors, shall not be perforated or penetrated by windborne debris, as determined by compliance with ASTM E1996-05 Level C.

423.5.8 Parapets. Parapets shall satisfy the wind load and missile impact criteria of the exterior envelope.

423.5.9 Roofs

423.5.9.1 Roof openings. Roof openings (e.g., HVAC fans, ducts, skylights) shall be provided with protection for the wind load and missile impact criteria of Sections 423.5.2 and 423.5.3.

423.5.9.2 High wind roof coverings. Roof coverings shall be specified and designed according to the latest ASTM Standards for high wind uplift forces.

423.5.9.3 Roof drainage. Roofs shall have adequate slope, drains and overflow drains or scuppers sized to accommodate 100-year hourly rainfall rates in accordance with Section 1611.1, but not less than 2-inches per hour for 6 continuous hours.

423.6 Ventilation

423.6.1 Mechanical ventilation. Mechanical ventilation as required in accordance with the International Mechanical Code. Air intakes and exhausts shall be designed and installed to meet the wind load and missile impact criteria of Sections 423.5.2 and 423.5.3.

423.6.2 HVAC equipment anchorage. HVAC equipment mounted on roofs and anchoring systems shall be designed and installed to meet the wind load criteria. Roof openings for roof-mounted HVAC equipment shall have a 12-

inch-high curb designed to prevent the entry of rain water.

423.7 Standby electrical system capability. Provide a standby emergency electrical power system per Chapter 27 and NFPA 70 Article 700 Emergency Systems and Article 701 Legally Required Standby Systems, which shall have the capability of being connected to an emergency generator or other temporary power source. The emergency system capabilities shall include:

1. An emergency lighting system;
2. Illuminated exit signs;
3. Fire protection systems, fire alarm systems and fire sprinkler systems; and
4. Minimum mechanical ventilation for health/safety purposes.

423.7.1 Emergency generator. When emergency generators are pre-installed, the facility housing the generator, permanent or portable, shall be an enclosed area designed to protect the generators from wind and missile impact. Generators hardened by the manufacturer to withstand the area's design wind and missile impact criteria shall be exempt from the enclosed area criteria requirement.

423.8 Quality assurance

423.8.1 Information on construction documents.

Construction documents shall include design criteria, the occupancy capacity of the enhanced hurricane protective area, and Project Specifications shall include opening protection devices. Floor plans shall indicate all enhanced hurricane protection area portions of the facility and exiting routes there from. The latitude and longitude coordinates of the building shall be recorded on the construction documents.

423.8.2. Special inspection. In addition to the requirements of Chapter 17, special inspections shall include at least the following systems and components:

1. Roof cladding and roof framing connections;
2. Wall connections to roof and floor diaphragms and framing;
3. Roof and floor diaphragm systems, including collectors, drag struts and boundary elements;
4. Vertical windforce-resisting systems, including braced frames, moment frames and shear walls;
5. Windforce-resisting system connections to the foundation; and
6. Fabrication and installation of systems or components required to meet the impact-resistance requirements of Section 1609.1.2.

Exception: Fabrication of manufactured systems or

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components that have a label indicating compliance with the wind-load and impact-resistance requirements of this code.

423.8.3 Quality assurance plan. A construction quality assurance program shall be included in the construction documents and shall include:

1. The materials, systems, components, and work required to have special inspection or testing by the building official or by the registered design professional responsible for each portion of the work;
2. The type and extent of each special inspection;
3. The type and extent of each test;
4. Additional requirements for special inspection or testing for seismic or wind resistance; and
5. For each type of special inspection, identification as to whether it will be continuous special inspection or periodic special inspection.

423.8.4 Peer review. Construction documents shall be independently reviewed by a Hawaii-licensed structural engineer. A written opinion report of compliance shall be submitted to State Civil Defense, the building official, and the owner.

423.9 Maintenance. The building shall be periodically inspected every three years and maintained by the owner to ensure structural integrity and compliance with this section. A report of inspection shall be furnished to the State Civil Defense.

423.10 Compliance re-certification when altered, deteriorated, or damaged. Alterations shall be reviewed by a Hawaii-licensed structural engineer to determine whether any alterations would cause a violation of this section. Deterioration or damage to any component of the building shall require an evaluation by a Hawaii-licensed structural engineer to determine repairs necessary to maintain compliance with this section." [Eff
(Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

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§3-180-53 Appendix W - Hawaii wind design provisions for new construction. Appendix W is added to read as follows:

"APPENDIX W

Hawaii Wind Design Provisions for New Construction

W101 Revisions to chapter 16. When Appendix W is adopted,

wind design shall be in accordance with Chapter 16 as amended by Sections W101.1 through W101.10.

W101.1 Revisions to section 1603.1. Section 1603.1 is amended to read as follows:

1603.1 General. Construction documents shall show the size, section, and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.8 shall be indicated on the construction documents.

Exception: Construction documents for buildings constructed in accordance with the conventional light-frame construction provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof live loads.
2. Ground snow load, P_g .
3. Basic wind speed (3-second gust), and effective wind speed V_{eff} (3-second gust), miles per hour (mph) (km/hr) and wind exposure.
4. Seismic design category and site class.
5. Flood design data, if located in flood hazard areas established in Section 1612.3.

W101.2 Revisions to section 1603.1.4. Section 1603.1.4 is amended to read as follows:

1603.1.4 Wind design data. The following information related to wind loads shall be shown, regardless of whether wind loads govern the design of the lateral-force-resisting system of the building:

1. Basic wind speed (3-second gust), miles per hour (km/hr), V , and effective windspeed V_{eff} .
2. Wind importance factor I , and building category.
3. Wind exposure, if more than one wind exposure is utilized, the wind exposure for each applicable wind direction shall be indicated.
4. The applicable internal pressure coefficient.
5. Components and cladding. The design wind pressures in terms of psf (kN/m^2) used for the design of exterior components, and cladding not specifically designed by the registered design professional.

W101.3 Revisions to section 1609.1.1. Section 1609.1.1 is amended to read as follows:

1609.1.1 Determination of wind loads. Wind loads on every building or structure shall be determined in accordance with Chapter 6 of ASCE 7. Minimum values for Directionality Factor, K_d , Velocity Pressure Exposure Coefficient, K_z , and Topographic Factor, K_{zt} , shall be

determined in accordance with Section 1609. The type of opening protection required, the basic wind speed and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

Exceptions:

1. Subject to the limitations of Section 1609.1.1.1, the provisions of SBCCI SSTD 10 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the AF&PA WFCM.
3. Designs using NAAMM FP 1001.
4. Designs using TIA/EIA-222 for antenna-supporting structures and antennas.

W101.4 Revisions to section 1609.1.2. Section 1609.1.2 is amended to read as follows:

1609.1.2 Protection of openings. In wind-borne debris regions, glazing in building shall be impact-resistant or protected with an impact-resistant covering meeting the requirements of an approved impact-resisting standard or ASTM E 1996 and ASTM E 1886 referenced therein as follows:

1. Glazed openings located within 30 feet (9144 mm) of grade shall meet the requirements of the Large Missile Test of ASTM E 1996.
2. Glazed openings located more than 30 feet (9144 mm) above grade shall meet the provisions of the Small Missile Test of ASTM E 1996.

Exceptions:

1. Wood structural panels with a minimum thickness of 7/16 inch (11.1 mm) and a maximum panel span of 8 feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut so that they shall be attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be secured with the attachment hardware provided. Attachments shall be designed to resist the components and cladding loads determined in accordance with the provisions of ASCE 7. Attachment in accordance with Table 1609.1.2 is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where wind speeds do not exceed 130 mph

- (57.2 m/s).
2. Glazing in Occupancy Category I buildings as defined in Section 1604.5, including greenhouses that are occupied for growing plants on a production or research basis, without public access shall be permitted to be unprotected.
 3. Glazing in Occupancy Category II, III or IV buildings located over 60 feet (18 288 mm) above the ground and over 30 feet (9144 mm) above aggregate surface roofs located within 1,500 feet (458 m) of the building shall be permitted to be unprotected.
 4. Glazing in Occupancy Category II and III buildings that can receive positive external pressure in the lower 60 feet (18 288 mm) shall be assumed to be openings unless such glazing is impact-resistant or protected with an impact-resistant system.

Exception: Glazing in Occupancy Category III buildings defined by Table 1604.5 of the following occupancies shall be provided with windborne debris protection:

1. Covered structures whose primary occupancy is public assembly with an occupant load greater than 300.
2. Health care facilities with an occupant load of 50 or more resident patients, but not having surgery or emergency treatment facilities.
3. Any other public building with an occupant load greater than 5,000.

Table 1609.1.2
Wind-Borne Debris Protection Fastening Schedule
For Wood Structural Panels^{a,b,c,d}

Fastener Type	Fastener Spacing		
	Panel span ≤ 4 feet	Panel span > 4 feet and ≤ 6 feet	Panel span > 6 feet and ≤ 8 feet
No. 6 screws	16"	12"	9"
No. 8 screws	16"	16"	12"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 0.454 kg,
1 mile per hour = 1.609 km/h.

a. This table is based on a maximum wind speed (3-second gust) of 130 mph and mean roof height of 33 feet or less.

b. Fasteners shall be installed at opposing ends of the wood structural panel. Fasteners shall be located a minimum of 1 inch from the edge of the panel.

c. Fasteners shall be long enough to penetrate through the exterior wall covering a minimum of 1.75 inches into wood wall framing; a minimum of 1.25 inches into concrete block or concrete; or into steel framing by at least three threads. Fasteners shall be located a minimum of 2.5 inches from the edge of concrete block or concrete.

d. Where screws are attached to masonry or masonry/stucco, they shall be attached utilizing vibration-resistant anchors having a minimum withdrawal capacity of 490 pounds.

1609.1.2.1 Building with openings. Where glazing is assumed to be an opening in accordance with Section 1609.1.2 #4, the building shall be evaluated to determine if the openings are of sufficient area to constitute an open or partially enclosed building as defined in ASCE 7. Open and partially enclosed buildings shall be designed in accordance with the applicable provisions of ASCE 7. Partially enclosed Group R-3 buildings shall also include a residential safe room in accordance with Section 422.

1609.1.2.2 Louvers. Louvers protecting intake and exhaust ventilation ducts not assumed to be open that are located within 30 ft (9144 mm) of grade shall meet requirements of an approved impact-resisting standard or the Large Missile Test of ASTM E 1996.

W101.5 Revisions to Section 1609.3. Section 1609.3 is amended to read as follows:

1609.3 Basic wind speed and topographic and directionality factors. The basic wind speed, in mph, for the determination of the wind loads shall be determined by Figure 1609.

Special wind regions near mountainous terrain and valleys are accounted within the Topographic Factor defined in Section 1609.3.3. Wind speeds derived from simulation techniques shall only be used in lieu of the basic wind speeds given in Figure 1609 when, (1) approved simulation or extreme-value statistical-analysis procedures are used (the use of regional wind speed data obtained from anemometers is not permitted to define the hurricane wind speed risk in Hawaii) and (2) the design wind speeds resulting from the study shall not be less than the resulting 700-year return period wind speed divided by $\sqrt{1.6}$.

W101.6 Addition of Section 1609.3.2. Section 1609.3.2 is added to read as follows:

1609.3.2 Effective basic wind speed conversion. For Section 2308.10.1, the provisions of ASCE 7 Section 6.4, and the exceptions permitted under Section 1609.1.1, the basic wind speed value used for determination of the wind loads, shall be the Effective Basic Wind Speed, V_{eff} , determined by Figure 1609.1.1.1, which adjusts the basic wind speed for special topographic wind regions.

W101.7 Addition of effective wind speed contour maps. Figures 1609.1.1.1(a) through 1609.1.1.1(f) are added

as follows:

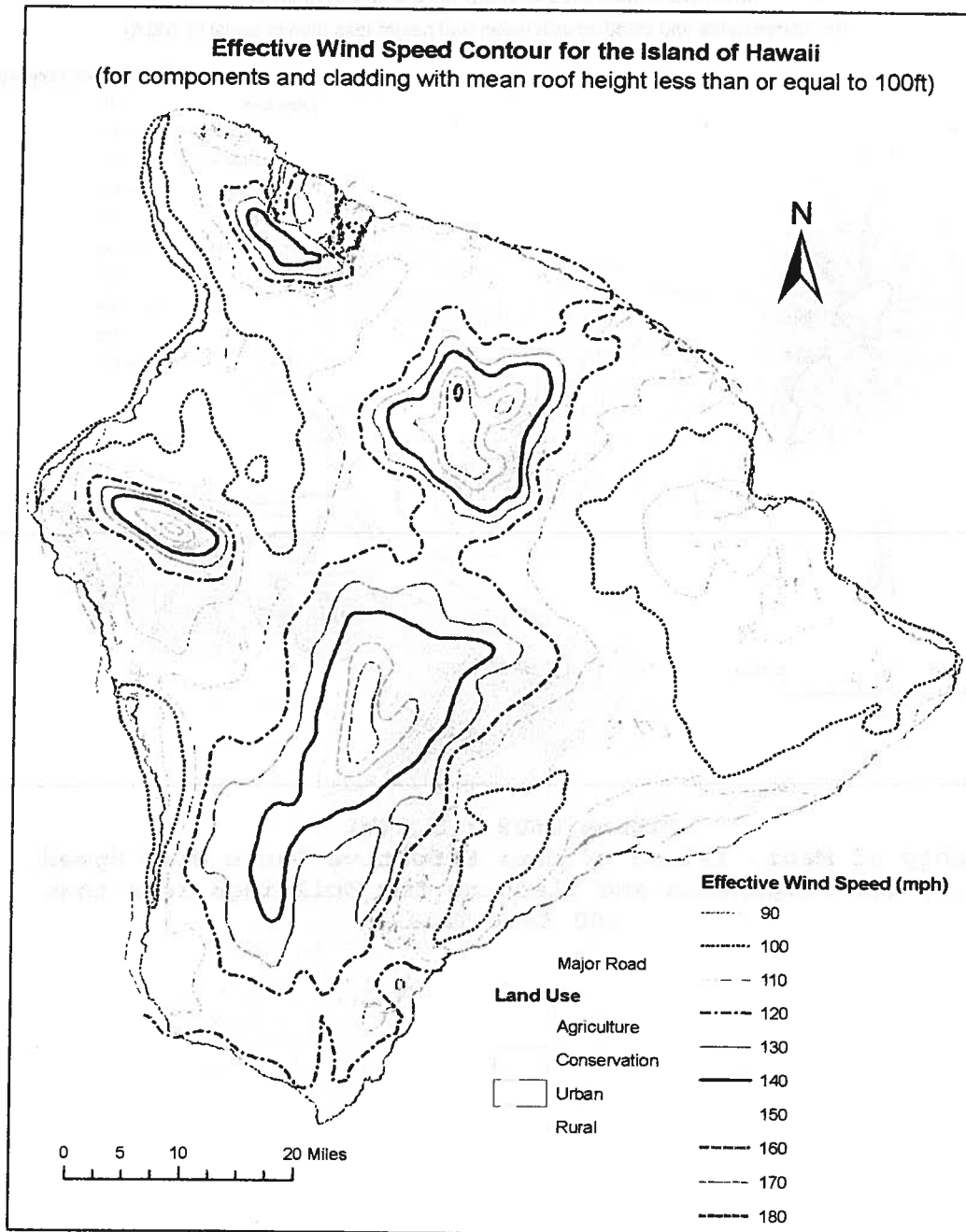


Figure 1609.1.1.1(a)
County of Hawaii Effective Basic Wind Speed, V_{eff} , for
Components and Cladding for Buildings less than 100 feet
Tall

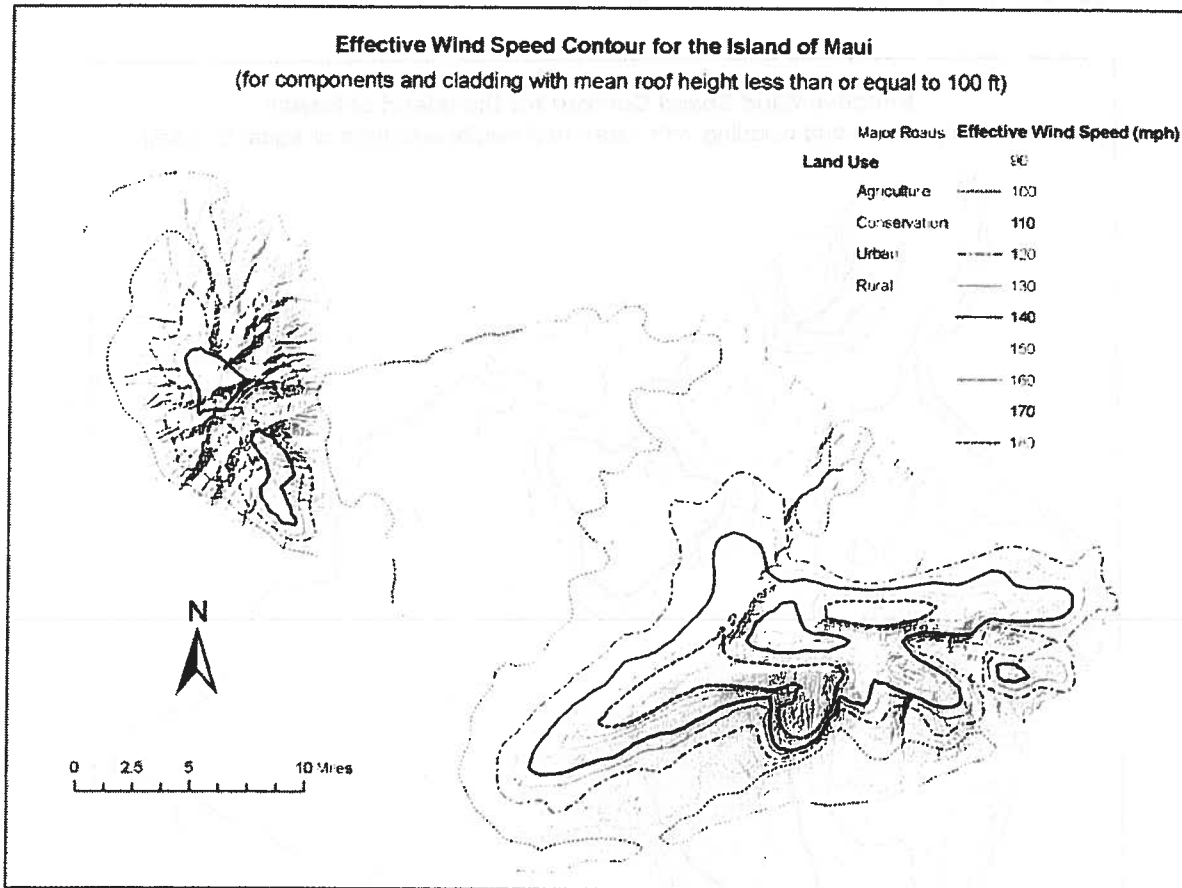


Figure 1609.1.1.1(b)
County of Maui, Island of Maui Effective Basic Wind Speed,
 V_{eff} , for Components and Cladding for Buildings less than
100 feet Tall

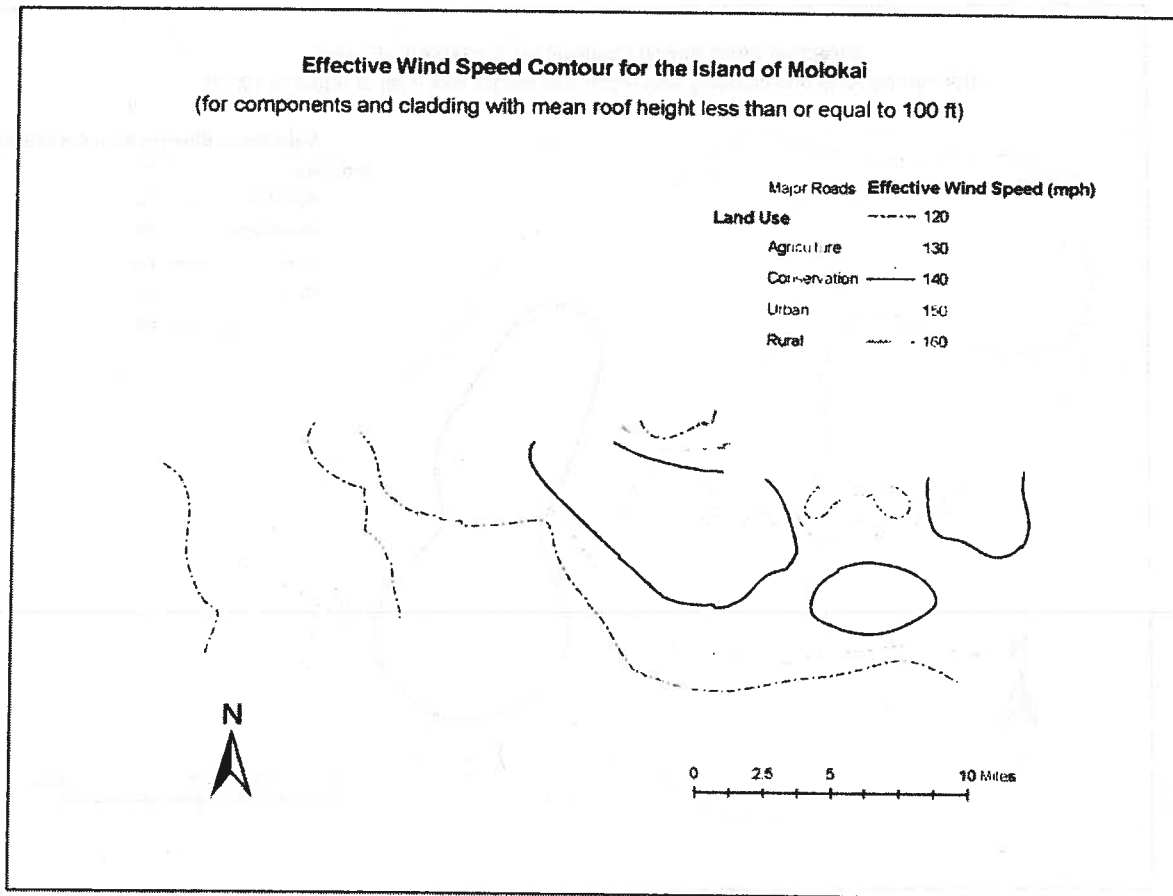


Figure 1609.1.1.1(c)
County of Maui, Island of Molokai Effective Basic Wind
Speed, V_{eff} , for Components and Cladding for Buildings less
than 100 feet Tall

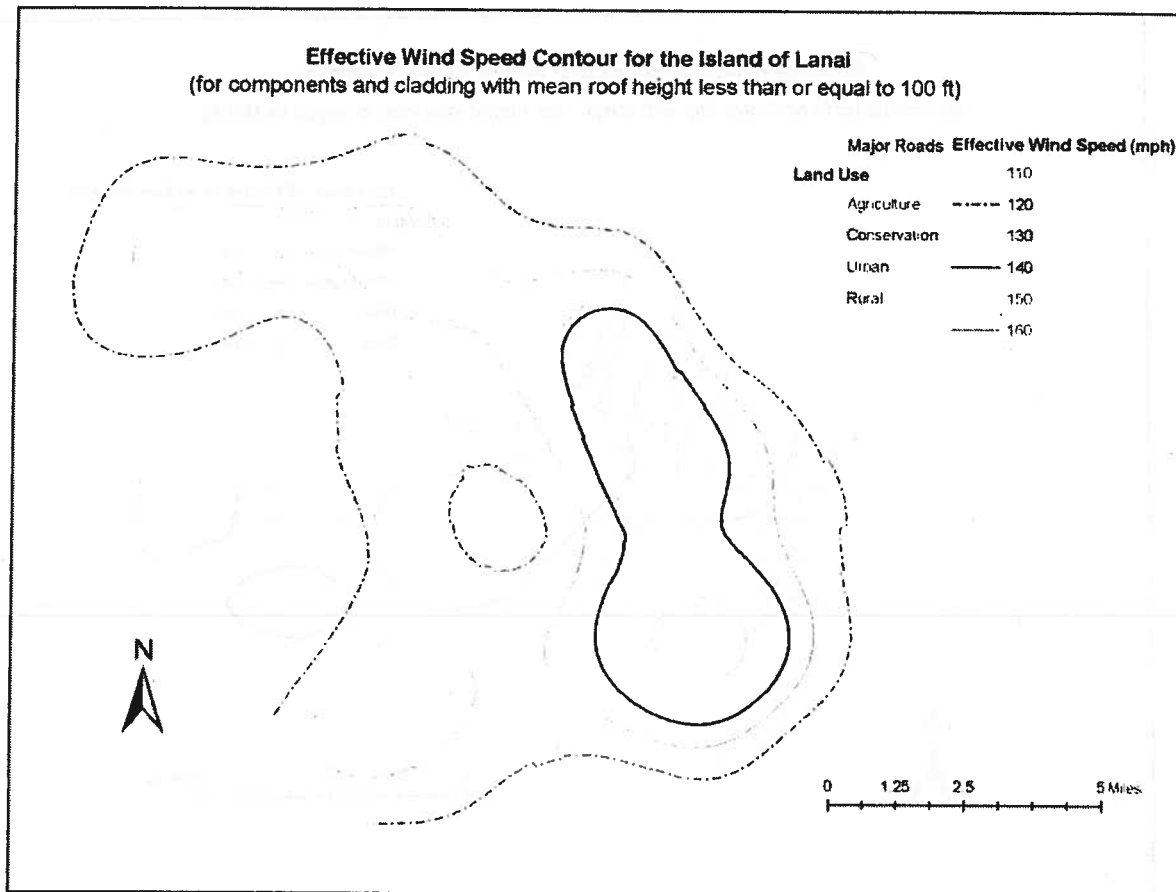


Figure 1609.1.1.1(d)
County of Maui, Island of Lanai Effective Basic Wind Speed,
 V_{eff} , for Components and Cladding for Buildings less than
100 feet Tall

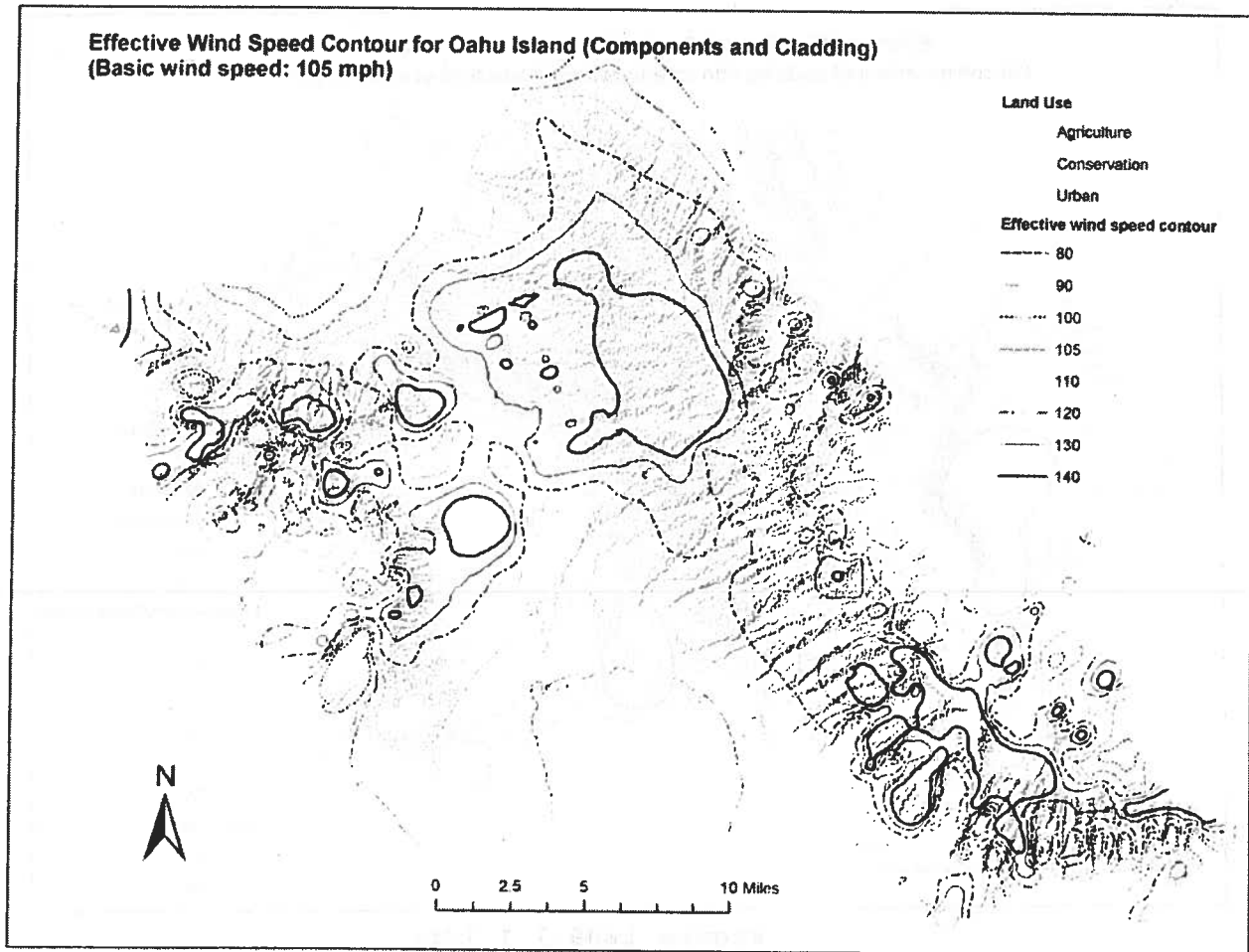


Figure 1609.1.1.1(e)
City and County of Honolulu Effective Basic Wind Speed, V_{eff} ,
for Components and Cladding for Buildings less than 60 feet
Tall

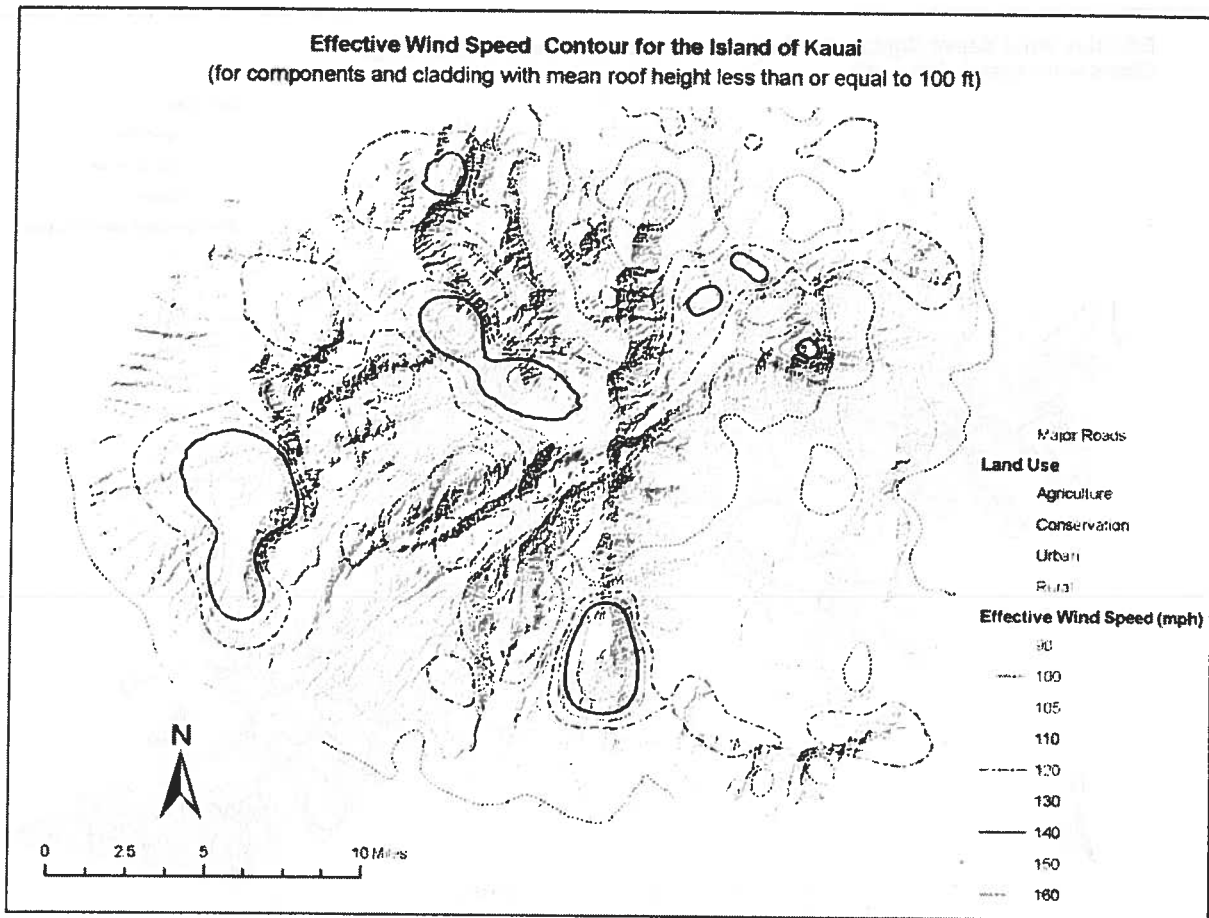


Figure 1609.1.1.1(f)
County of Kauai Effective Basic Wind Speed, V_{eff} , for
Components and Cladding for Buildings less than 100 feet
Tall

W101.8 Addition of section 1609.3.3. Section 1609.3.3 is added to read as follows:

1609.3.3 Topographic effects. Wind speed-up effects caused by topography shall be included in the calculation of wind loads by using the factor K_{zt} , where K_{zt} is given in Figures 1609.3.3(a) through 1609.3.3(f).

Exception: Site-specific probabilistic analysis of directional K_{zt} based on wind-tunnel testing of topographic speed-up shall be permitted to be submitted for approval by the building official.

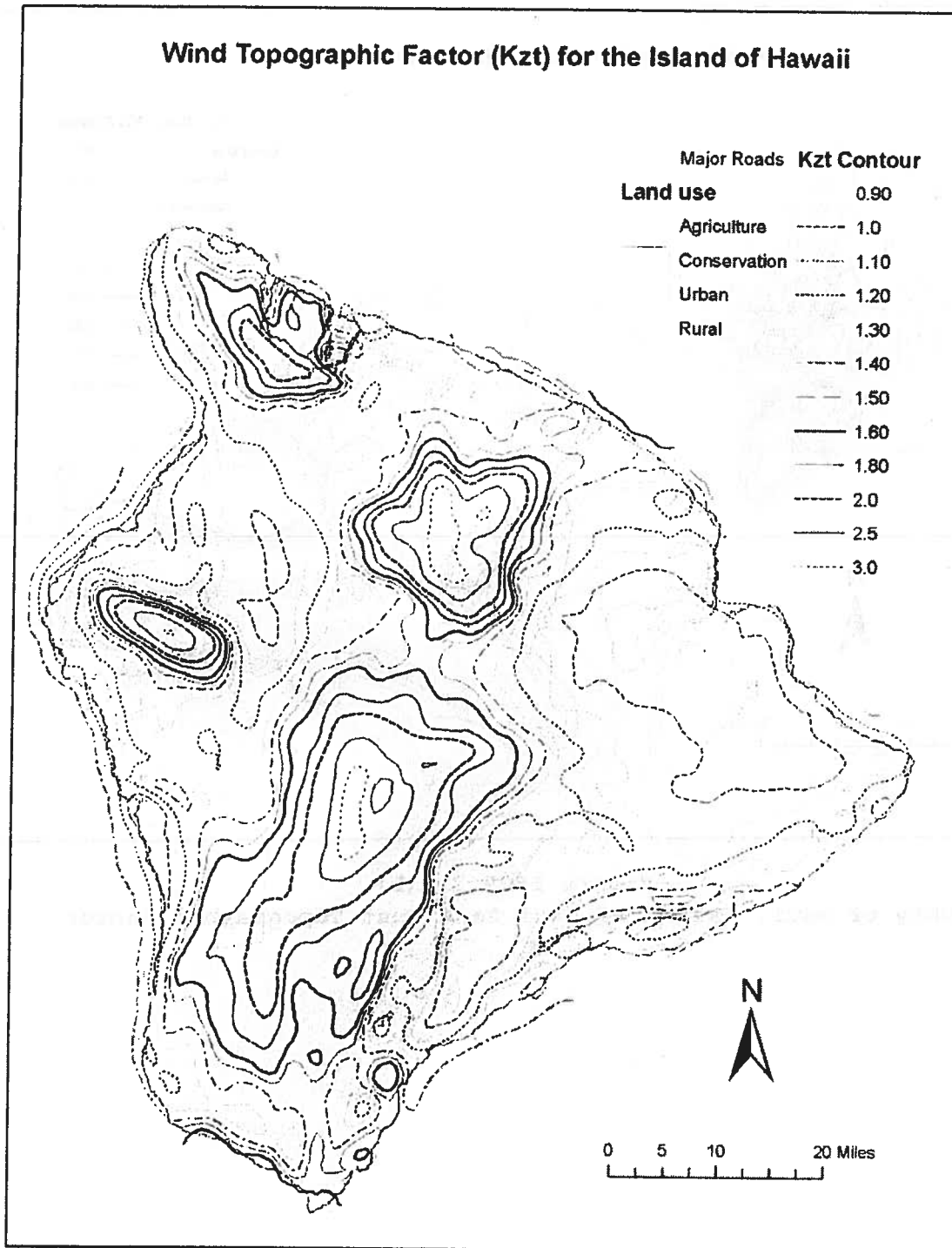


Figure 1609.3.3(a)
County of Hawaii Peak Gust Topographic Factor K_{zt}

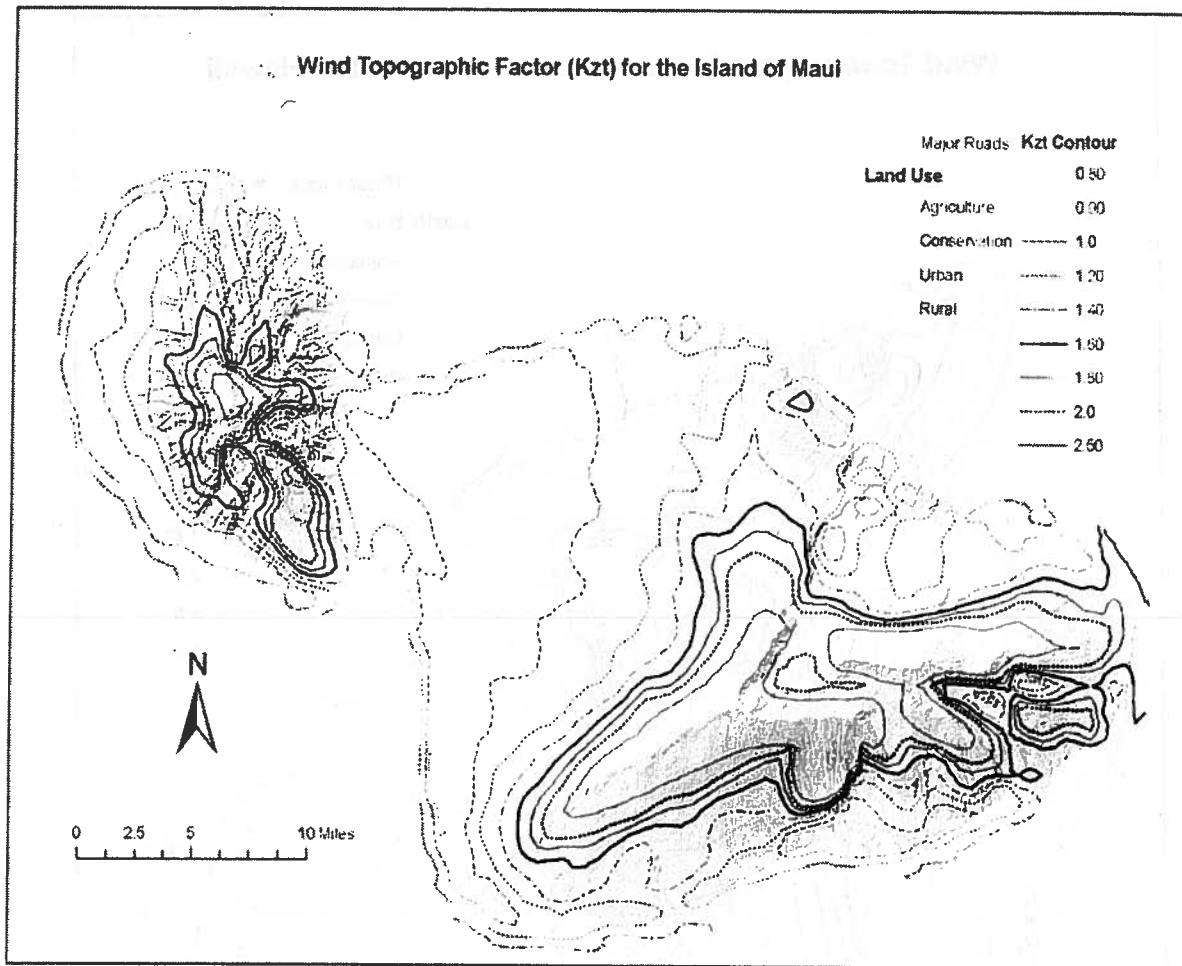


Figure 1609.3.3(b)
County of Maui, Island of Maui Peak Gust Topographic Factor
 K_{zt}

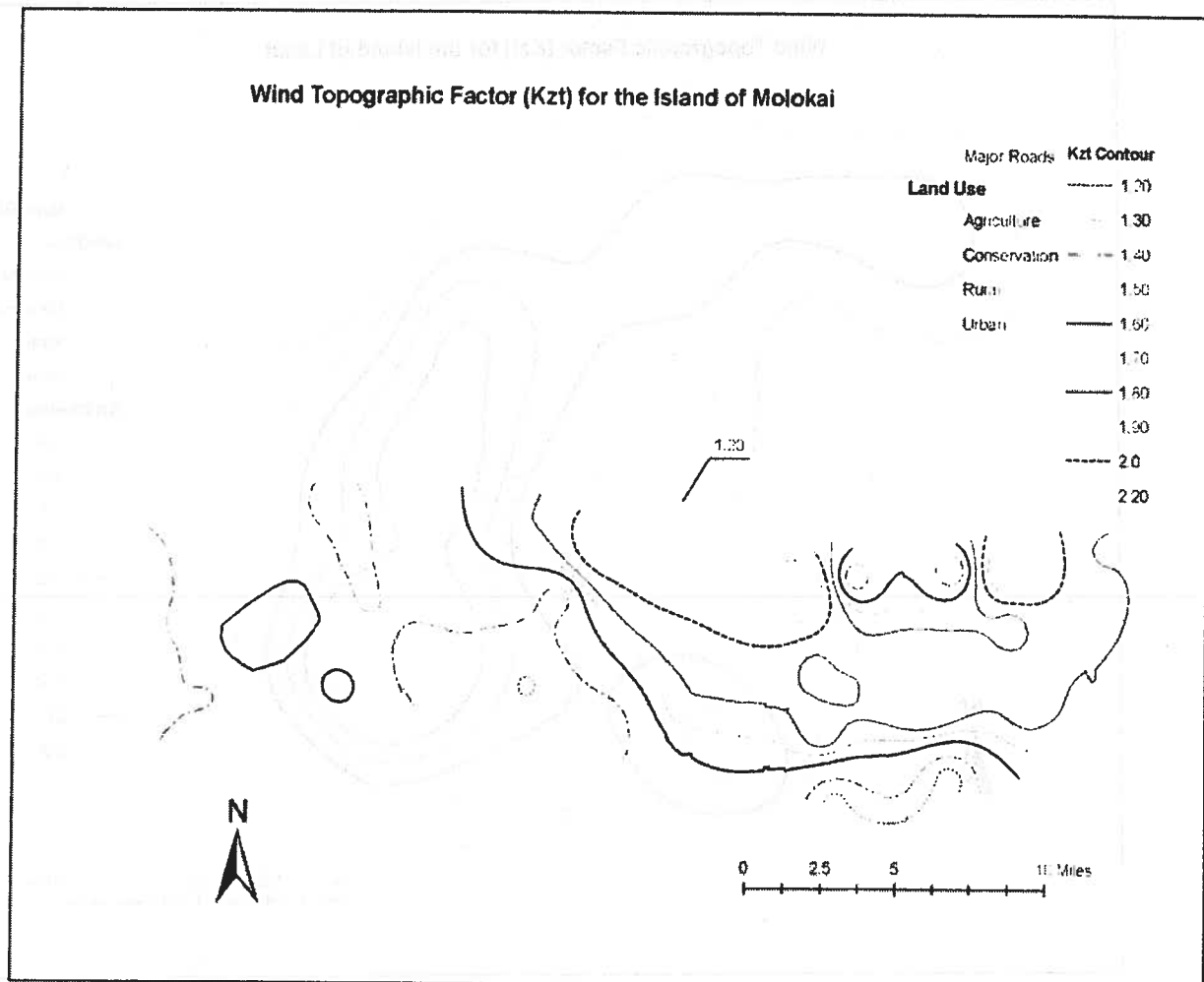


Figure 1609.3.3(c)
County of Maui, Island of Molokai Peak Gust Topographic
Factor K_{zt}

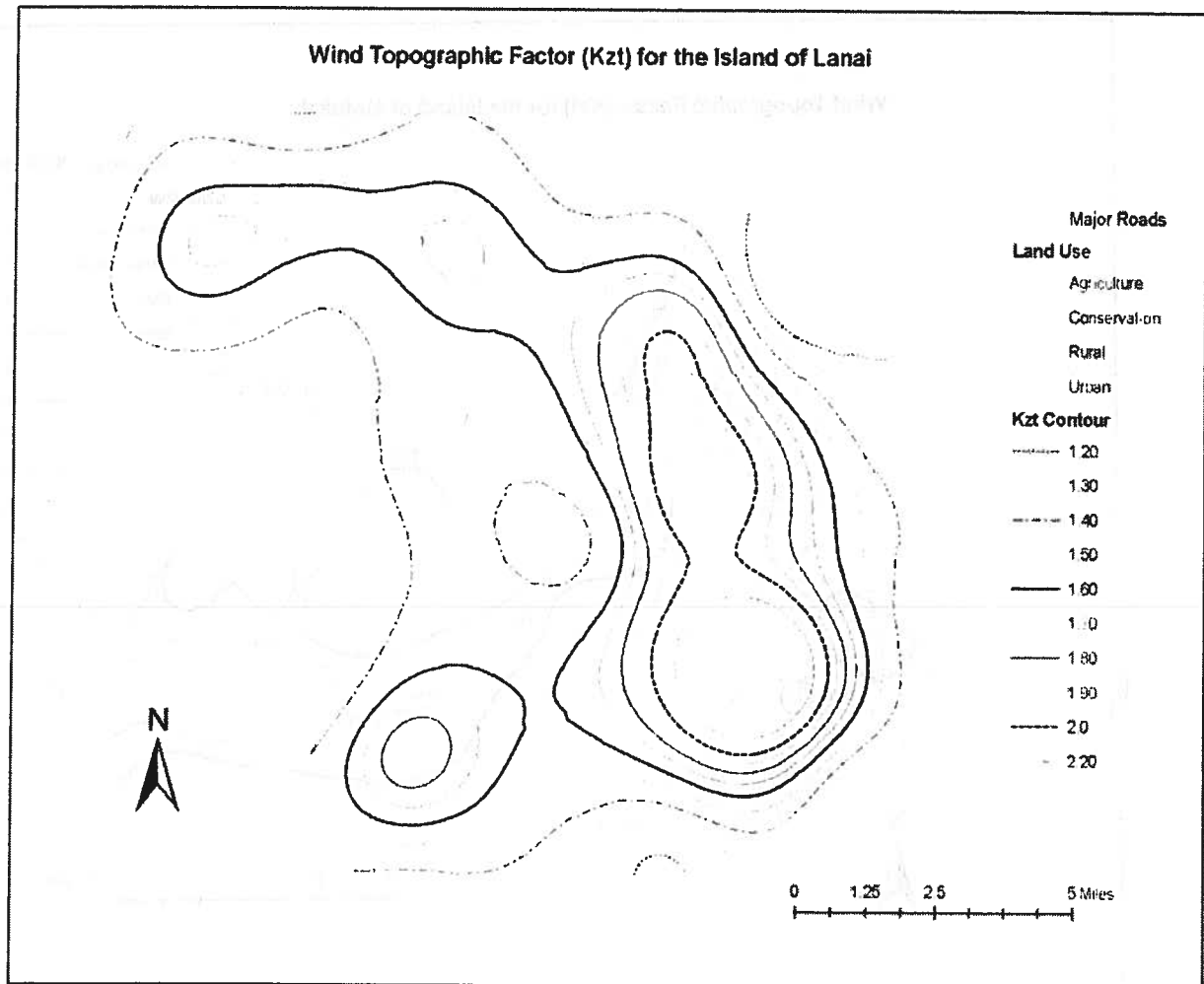


Figure 1609.3.3(d)
County of Maui, Island of Lanai Peak Gust Topographic
Factor K_{zt}

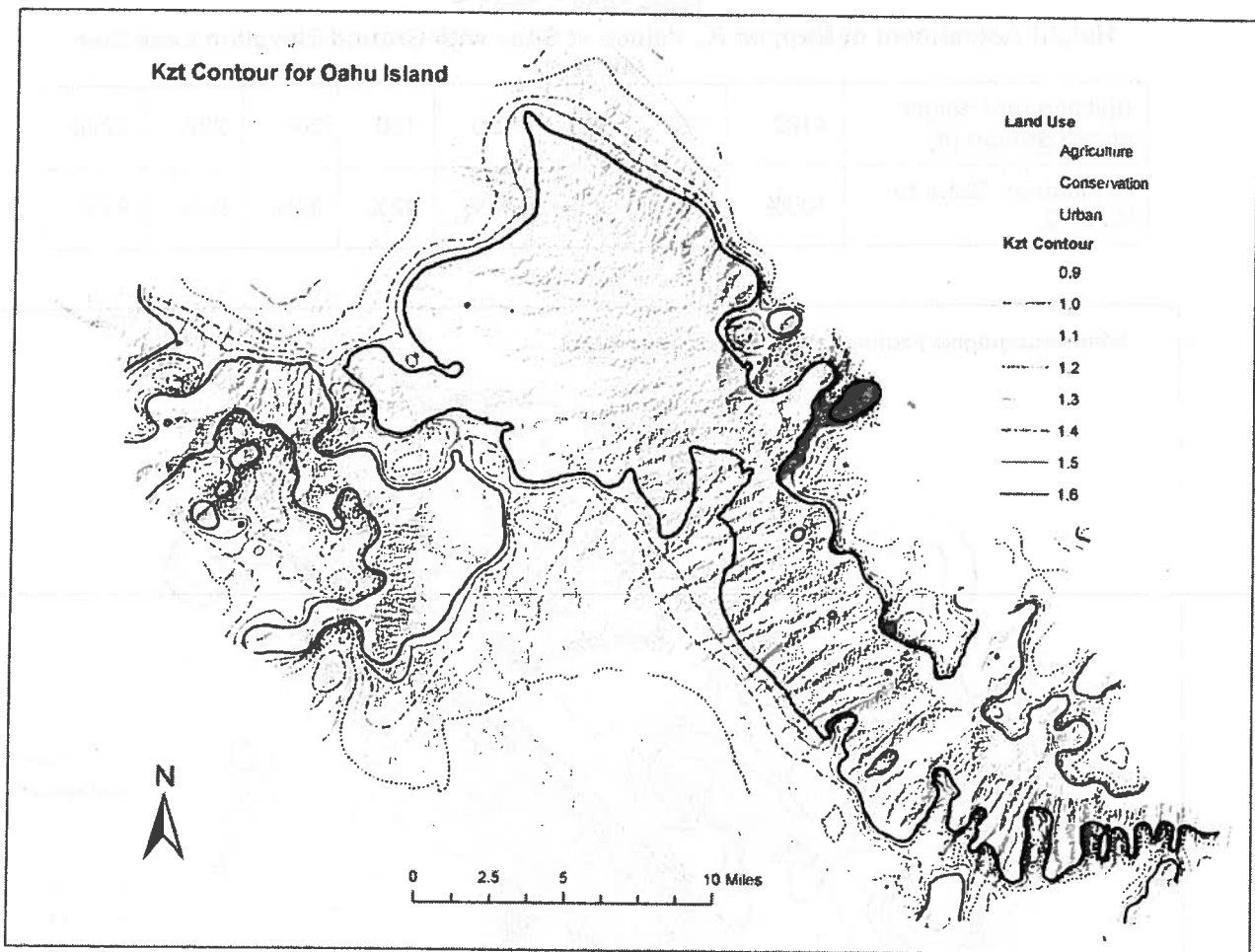


Figure 1609.3.3(e)
City and County of Honolulu Peak Topographic Factor K_{zt} for
Building Heights up to 100 feet^{a,b}

- Site-specific probabilistic analysis of directional K_{zt} based on wind-tunnel testing of topographic speed-up shall be permitted to be submitted for approval by the building official. For buildings taller than 160 feet, this submittal shall include peak gust velocity profiles for all wind direction sectors.
- At Exposure B sites with ground elevations less than 500 feet, K_{zt} values ≥ 1.2 shall be permitted to be reduced for building heights greater than 100 feet by multiplying K_{zt} mapped in Figure 1609.3.3(e) by the height adjustments given in the Table 1609.3.3(e)2. Interpolation is permitted.

Table 1609.3.3(e)2
Height Adjustment of Mapped K_{zt} Values at Sites with Ground Elevation Less than 500 feet

Building roof height above ground (ft)	≤100	120	140	160	180	200	220	≥240
Adjustment factor to $K_{zt} \geq 1.2$	100%	98%	96%	94%	92%	90%	92%	94%

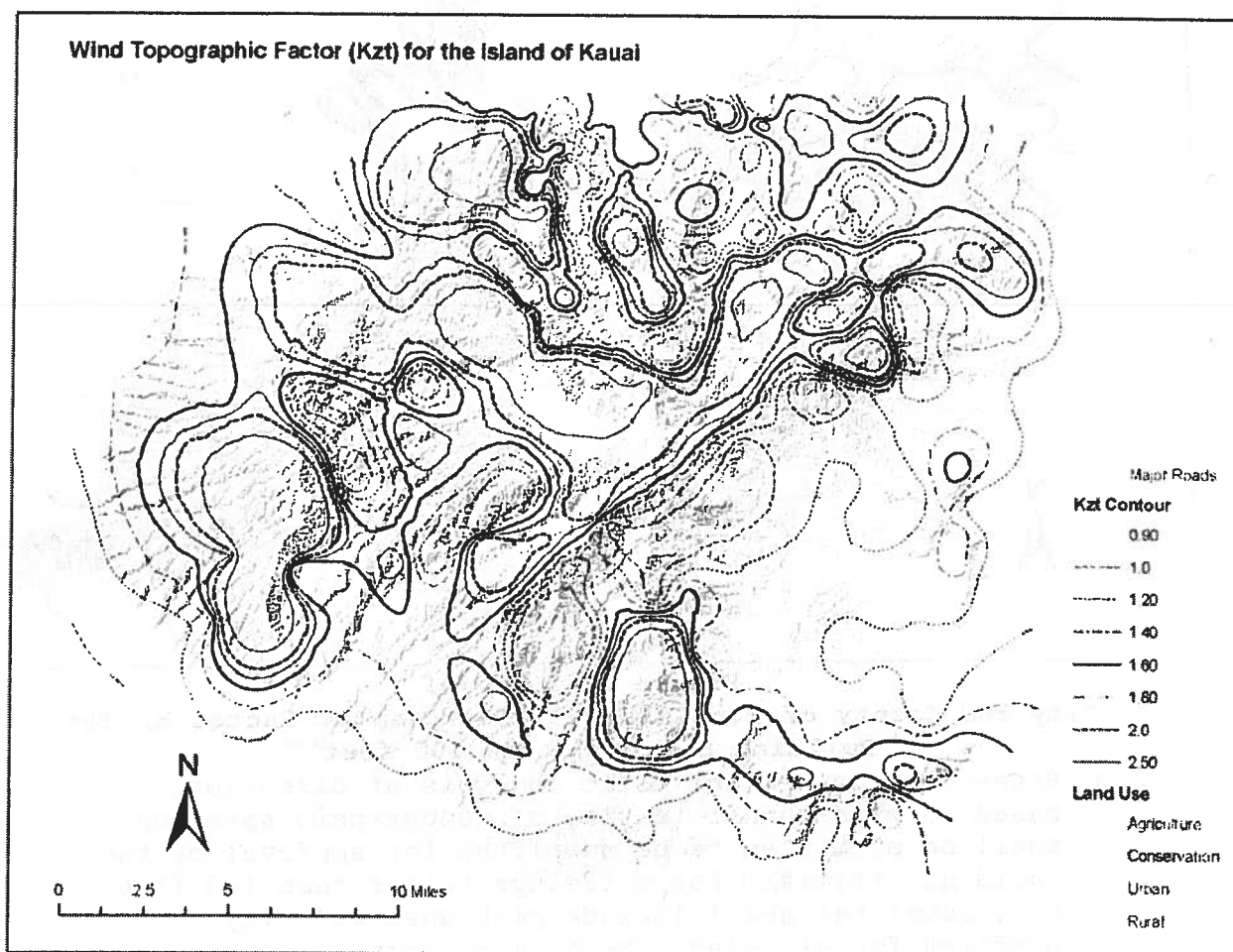


Figure 1609.3.3(f)
County of Kauai Peak Gust Topographic Factor K_{zt}

W101.9 Directionality factor. Section 1609.3.4 is added to read as follows:

1609.3.4 Directionality factor. The wind directionality factor, K_d , shall be determined from Tables

1609.3.4(a)(1) through 1609.3.4(a)(3) and 1609.3.4(b)(1) through 1609.3.4(b)(3), and Figures 1609.3.4(a)(4) and 1609.3.4(b)(4).

Table 1609.3.4(a)(1)
 K_d Values for Main Wind Force Resisting Systems Sited in Hawaii County^{a,b}

Topographic Location on the Island of Hawaii	Main Wind Force Resisting Systems		Main Wind Force Resisting Systems with totally independent systems in each orthogonal direction		Biaxially Symmetric and Axisymmetric Structures of any Height and Arched Roof Structures
	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	
Sites in North Kohala, South Kohala, South Kona, South Hilo, and Puna Districts at an elevation not greater than 3000 ft.	0.65	0.70	0.70	0.75	0.85
All other sites	0.70	0.80	0.75	0.80	0.95

- The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but K_d shall have a value not less than 0.65.

Table 1609.3.4(a)(2)
 K_d Values for Main Wind Force Resisting Systems Sited in Maui County ^{a,b}

Topographic Location in the County of Maui	Main Wind Force Resisting Systems		Main Wind Force Resisting Systems with totally independent systems in each orthogonal direction		Biaxially Symmetric and Axisymmetric Structures of any Height and Arched Roof Structures
	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	
Sites on the Island of Maui at an elevation not greater than 1000 ft.	0.60	0.65	0.70	0.75	0.85
Sites on the Island of Maui at an elevation greater than 1000 ft.	0.65	.70	0.75	0.80	0.90
All other sites on the Islands of Molokai and Lanai	0.80	0.85	0.80	0.85	0.95

- a. The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- b. Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but K_d shall have a value not less than 0.60.

Table 1609.3.4(a)(3)
 K_d Values for Main Wind Force Resisting Systems Sited on Oahu, Hawaii^{a,b}

Topographic Location on Oahu, Hawaii	Main Wind Force Resisting Systems		Main Wind Force Resisting Systems with totally independent systems in each orthogonal direction		Biaxially Symmetric and Axisymmetric Structures of any Height and Arched Roof Structures
	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	
Sites within valleys at an elevation of at least 50 ft. but not greater than 500 ft.	0.65	0.70	0.70	0.75	0.85
Central Oahu above an elevation of 500 ft, the Ewa and Kapolei plains, and coastal areas with K_{zt} (10m) not greater than 1.2	0.75	0.80	0.75	0.80	0.95
All other areas, including Hills, Hillsides, Ridges, Bluffs, and Escarpments at any elevation or height; coastal and inland areas with K_{zt} (10m) greater than 1.2	0.70	0.75	0.75	0.80	0.90

- The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but K_d shall have a value not less than 0.65.

§3-180-53

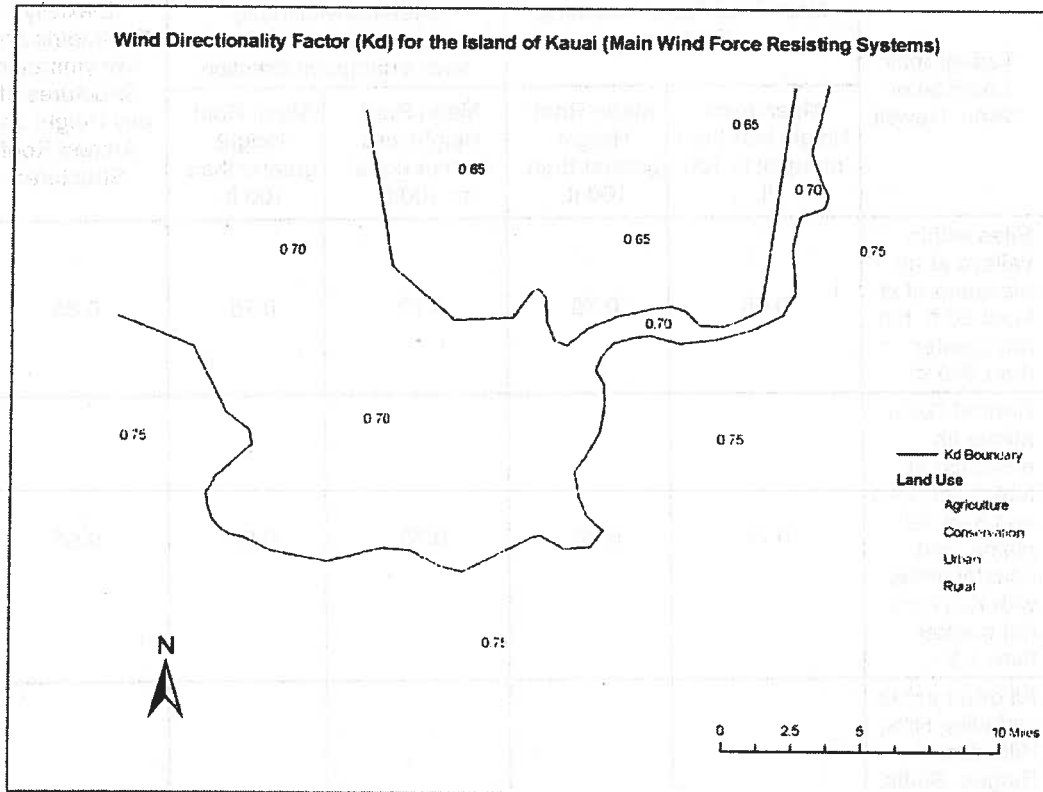


Figure 1609.3.4(a) (4)

K_d Values for Main Wind Force Resisting Systems Sited on Kauai County, Hawaii^{a, b}

- a. The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- b. Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but K_d shall have a value not less than 0.65.

Table 1609.3.4(b)(1)
 K_d Values for Components and Cladding of Buildings Sited in Hawaii County^{a,b}

Topographic Location on the Island of Hawaii	Components and Cladding		
	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	Occupancy Category IV Buildings and Structures
Sites in North Kohala, South Kohala, South Kona, South Hilo, and Puna Districts at an elevation not greater than 3000 ft.	0.65	0.70	0.75
All other sites	0.75	0.80	0.85

- The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but in any case subject to a minimum value of 0.65.

Table 1609.3.4(b)(2)
 K_d Values for Components and Cladding of Buildings Sited in Maui County^{a,b}

Topographic Location on the County of Maui	Components and Cladding		
	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	Occupancy Category IV Buildings and Structures
Sites on the Island of Maui at an elevation not greater than 1000 ft	0.65	0.70	0.75
Sites on the Island of Maui at an elevation greater than 1000 ft.	0.70	0.75	0.85
All other sites on the Islands of Molokai and Lanai	0.80	0.85	0.85

- The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but in any case subject to a minimum value of 0.65.

Table 1609.3.4(b)(3)
 K_d Values for Components and Cladding of Buildings Sited on Oahu, Hawaii ^{a,b}

Topographic Location on Oahu	Components and Cladding		
	Mean Roof Height less than or equal to 100 ft.	Mean Roof Height greater than 100 ft.	Occupancy Category IV Buildings and Structures
Sites within valleys at an elevation of at least 50 ft. but not greater than 500 ft.	0.65	0.70	0.75
Central Oahu above an elevation of 500 ft, the Ewa and Kapolei plains, and coastal areas with K_{zt} (10m) not greater than 1.2	0.75	0.80	0.85
All other areas, including Hills, Hillside, Ridges, Bluffs, and Escarpments at any elevation or height; coastal and inland areas with K_{zt} (10m) greater than 1.2	0.70	0.75	0.80

- a. The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- b. Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but in any case subject to a minimum value of 0.65.

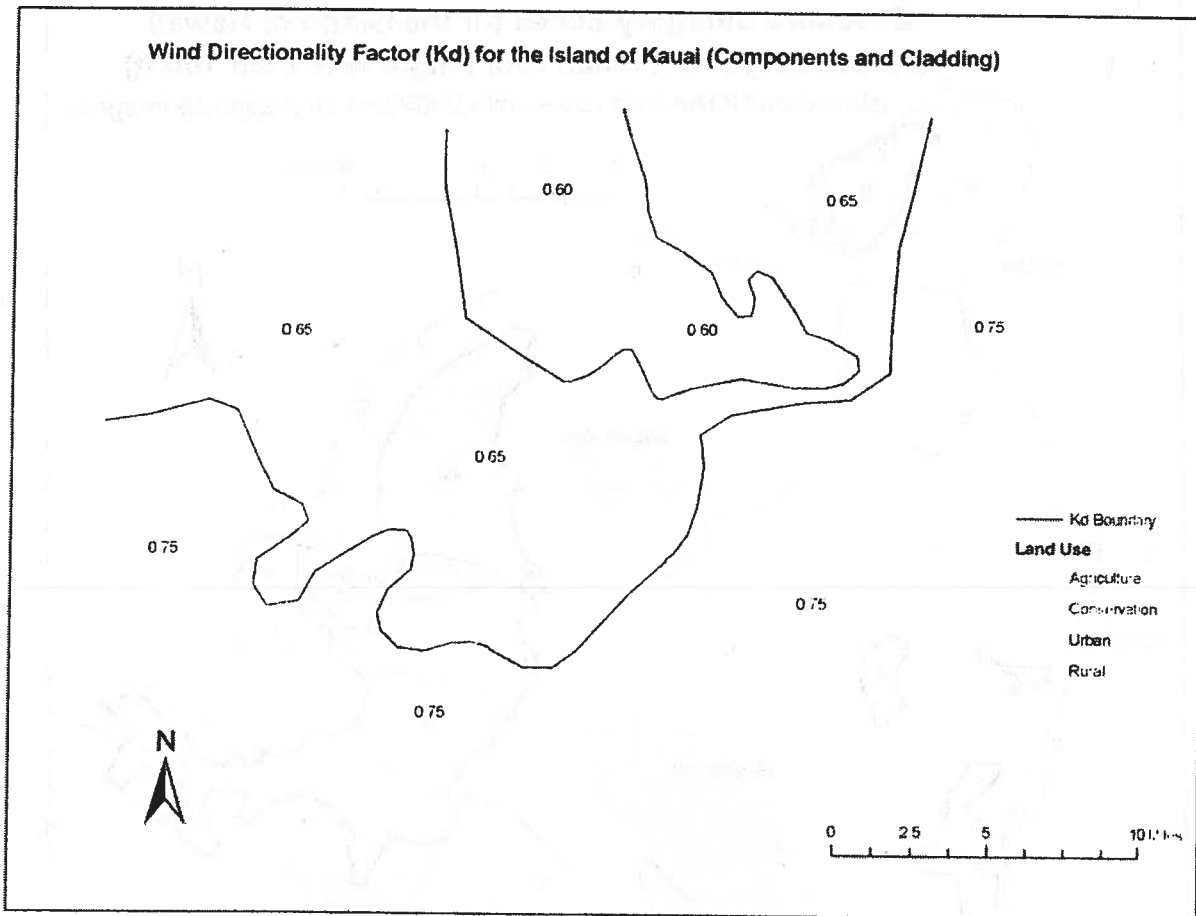


Figure 1609.3.4(b) (4)
 K_d Values for Components and Cladding of Buildings Sited on
Kauai County, Hawaii ^{a,b}

- a. The values of K_d for other non-building structures indicated in ASCE 7 Table 6-4 shall be permitted.
- b. Site-specific probabilistic analysis of K_d based on wind-tunnel testing of topography and peak gust velocity profile shall be permitted to be submitted for approval by the building official, but K_d shall have a value not less than 0.65.

W101.10 Addition of exposure category maps. Section 1609.4.4 is added to read as follows:

1609.4.4 Exposure category maps. Exposure categories are permitted to be determined using Figures 1609.4.4(a) through 1609.4.4(e).

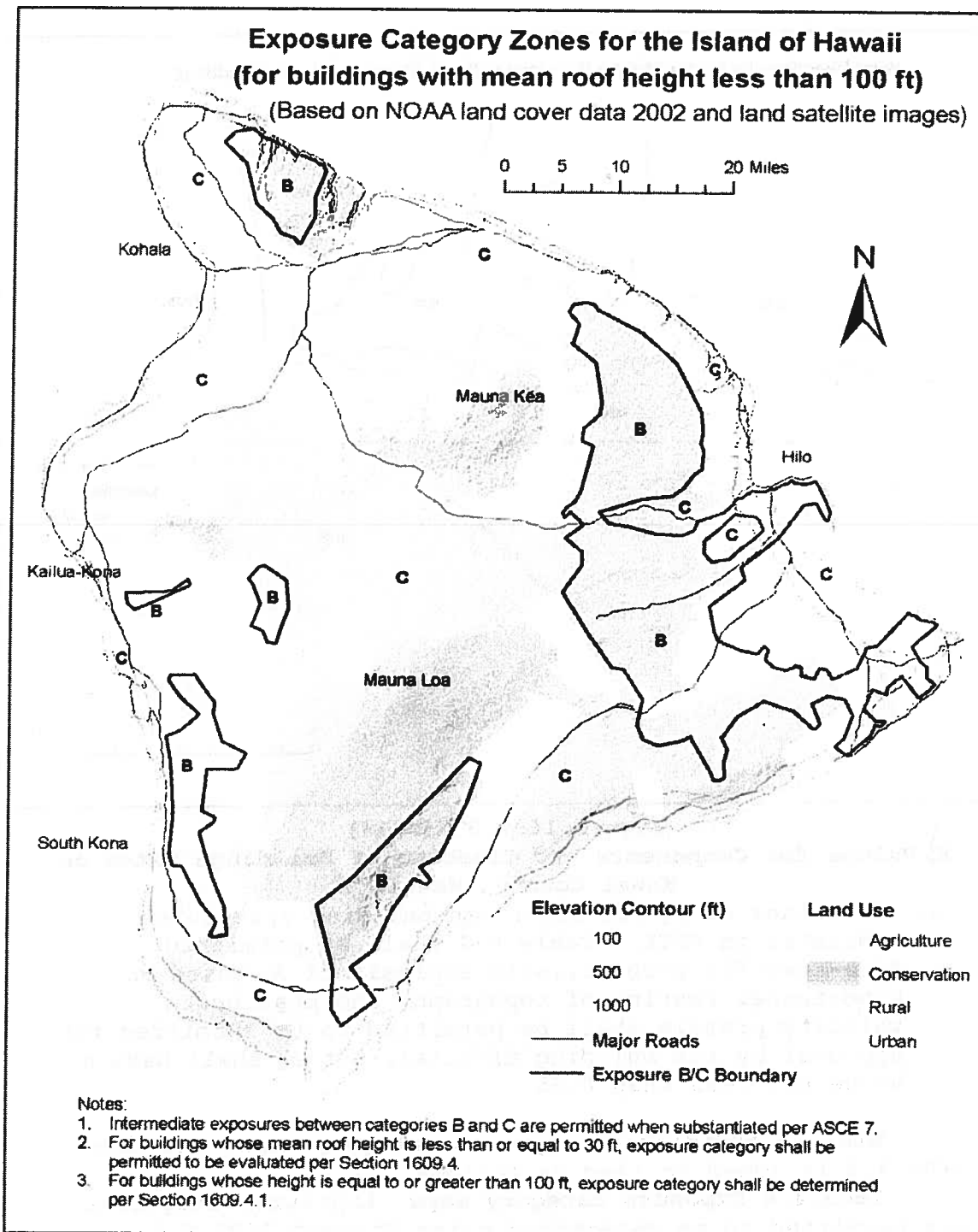


Figure 1609.4.4(a)
Exposure Category Zones for Hawaii County

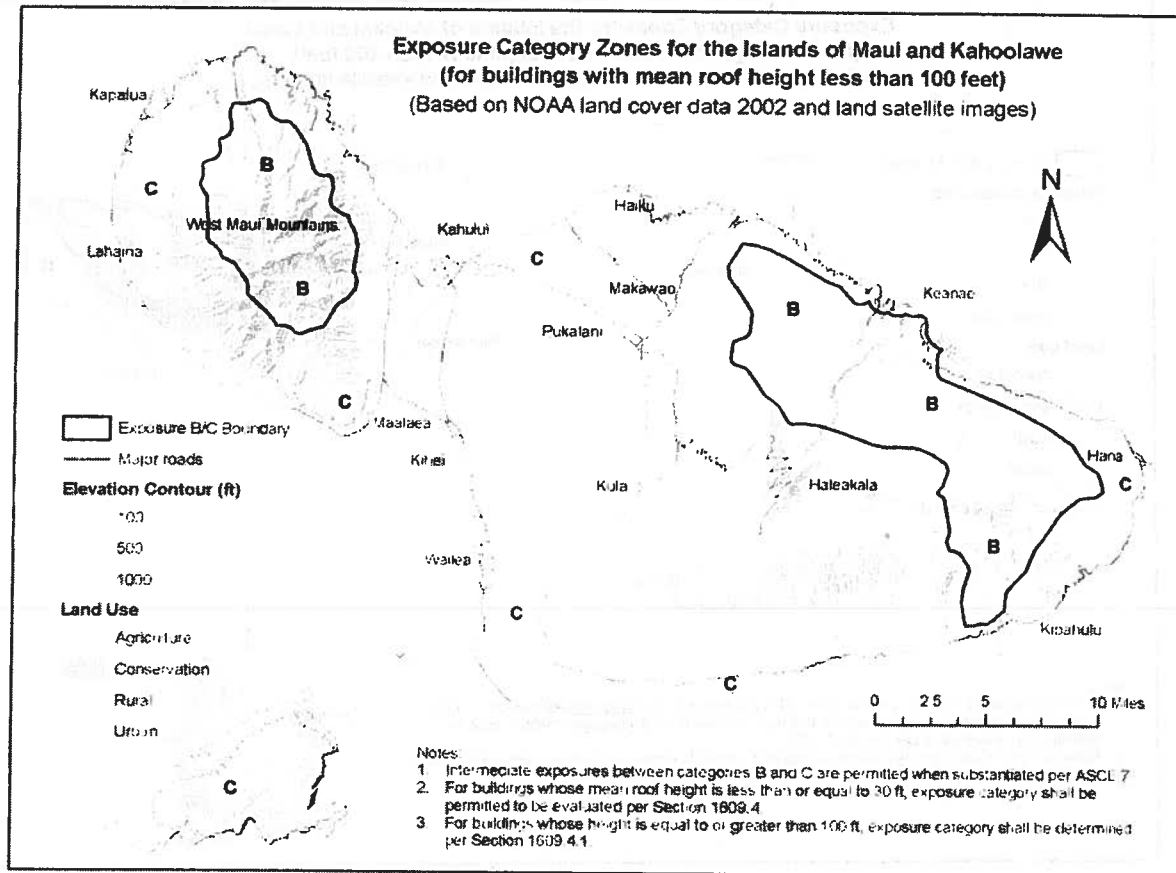


Figure 1609.4.4(b)
Exposure Category Zones for Island of Maui, Maui County

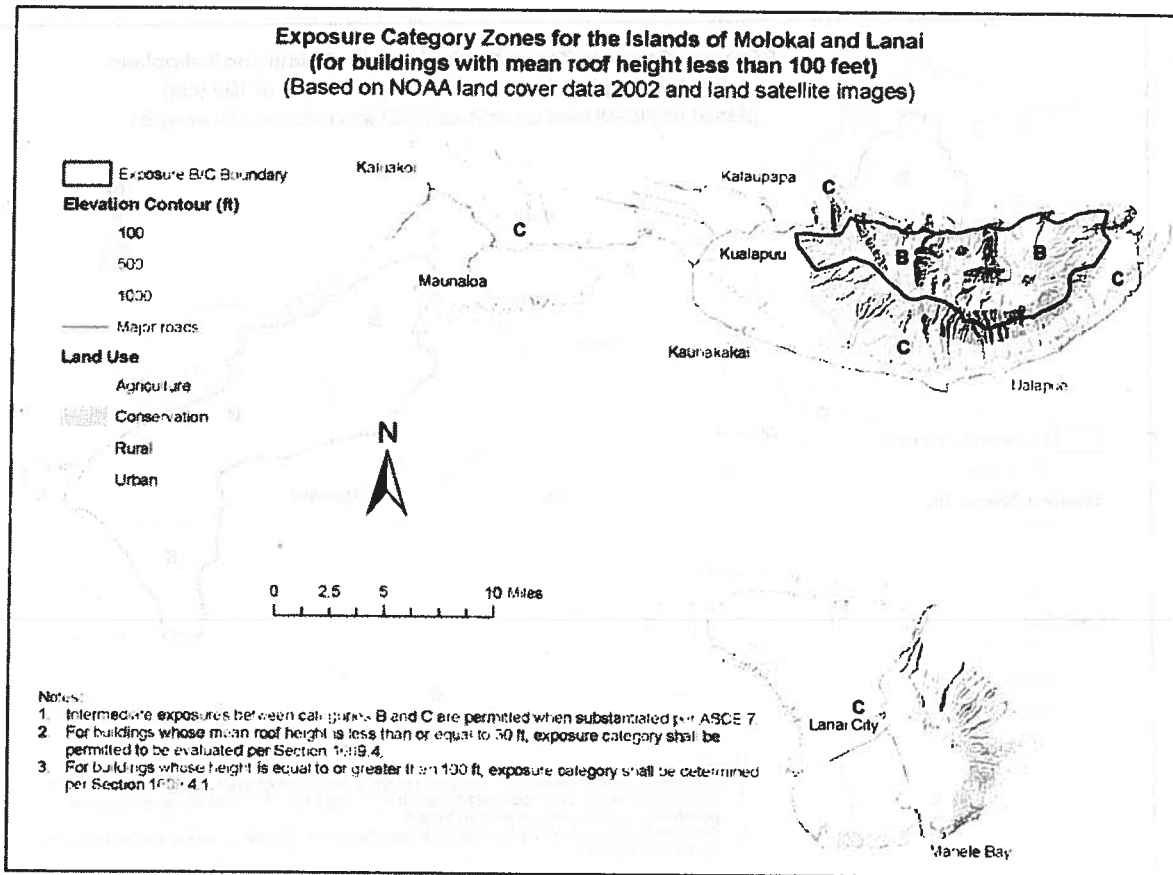


Figure 1609.4.4(c)
Exposure Category Zones for Islands of Molokai and Lanai,
Maui County

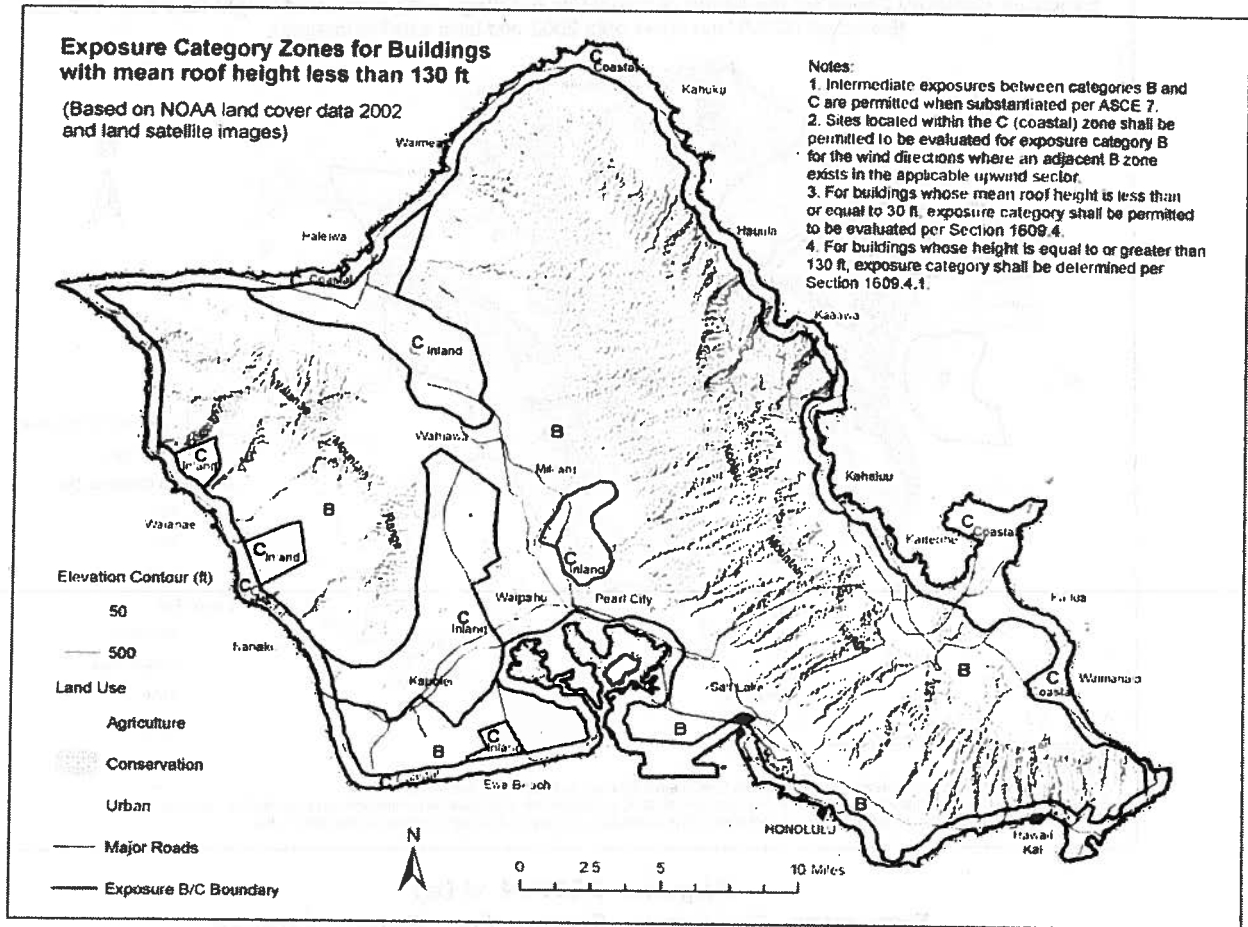


Figure 1609.4.4(d)
Exposure Category Zones for the City and County of Honolulu

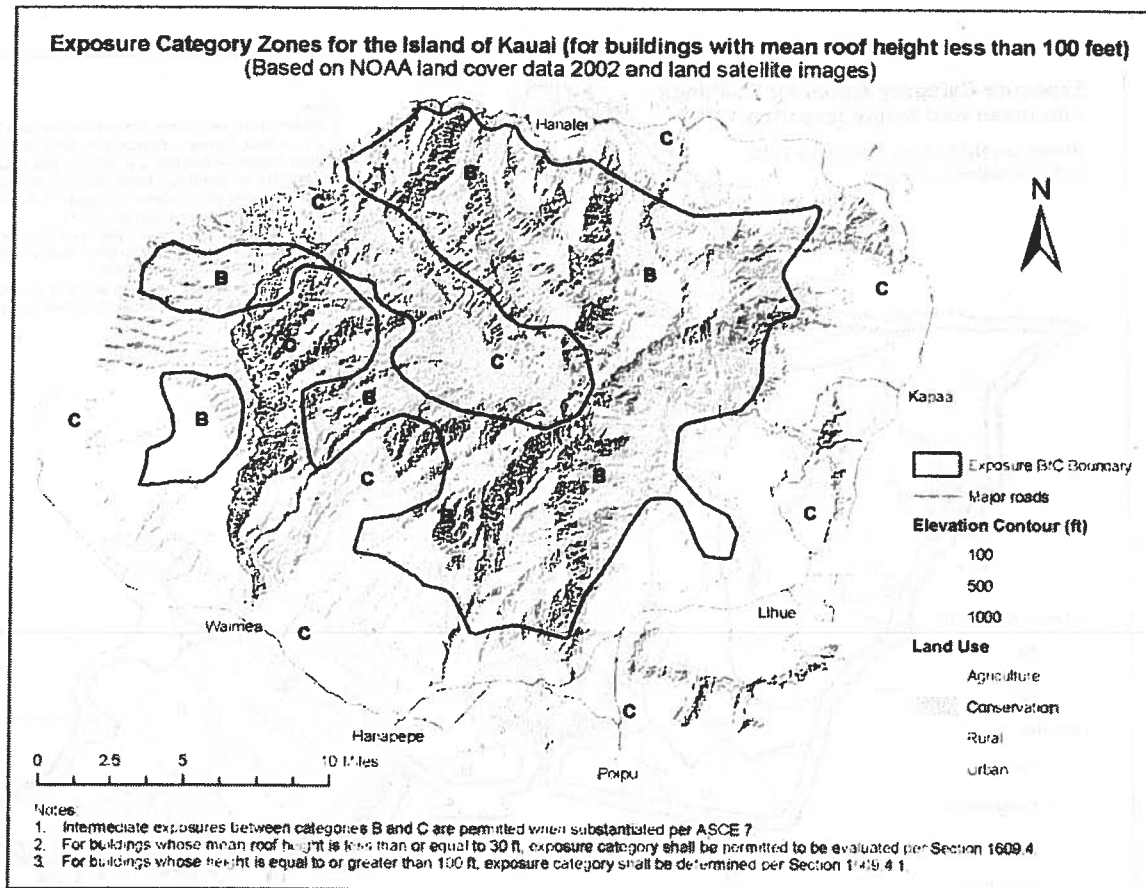


Figure 1609.4.4(e)
Exposure Category Zones for Kauai County

W102 Revisions to Chapter 23. When Appendix W is adopted, wood construction shall be in accordance with Chapter 23 as amended by Sections W102.1 and W102.2.

W102.1 Revisions to Section 2308.2.1. Section 2308.2.1 is amended to read as follows:

2308.2.1 Basic wind speed greater than 100 mph. Where the Effective Basic Wind Speed exceeds 100 mph, the provisions of the AF&PA WFCM, or the SBCCI SSTD 10 are permitted to be used.

W102.2 Revisions to Table 2308.10.1. Table 2308.10.1 is amended to read as follows:

Table 2308.10.1
Required Rating of Approved Uplift Connectors (pounds)^{a,b,c,d,e,f,g,h,i}

Effective Basic Wind Speed V_{eff} , 3-sec gust	Roof Span (feet)							Overhangs (pounds/ft) ^d
	12	20	24	28	32	36	40	
85	-72	-120	-144	-168	-192	-216	-240	-38.55
90	-91	-152	-182	-213	-243	-274	-304	-43.22
100	-131	-218	-262	-305	-349	-392	-436	-53.36
110	-175	-292	-350	-409	-467	-526	-584	-64.56
120	-240	-400	-480	-560	-640	-720	-800	-76.83
130	-304	-506	-607	-708	-810	-911	-1012	-90.17

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.61 km/hr, 1 pound = 0.454 Kg, 1 pound/foot = 14.5939 N/m.

- a. The uplift connection requirements are based on a 30-foot mean roof height located in Exposure B. For Exposure C and for other mean roof heights, multiply the above loads by the adjustment coefficients below.

Exposure	Mean Roof Height (feet)									
	15	20	25	30	35	40	45	50	55	60
B	1.00	1.00	1.00	1.00	1.05	1.09	1.12	1.16	1.19	1.22
C	1.21	1.29	1.35	1.40	1.45	1.49	1.53	1.56	1.59	1.62

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.61 km/hr, 1 pound = 0.454 Kg, 1 pound/foot = 14.5939 N/m.

- b. The uplift connection requirements are based on the framing being spaced 24 inches on center. Multiply by 0.67 for framing spaced 16 inches on center and multiply by 0.5 for framing spaced 12 inches on center.
- c. The uplift connection requirements include an allowance for 10 pounds of dead load.
- d. The uplift connection requirements do not account for the effects of overhangs. The magnitude of the above loads shall be increased by adding the overhang loads found in the table. The overhang loads are also based on framing spaced 24 inches on center. The overhang loads given shall be multiplied by the overhang projection and added to the roof uplift value in the table.
- e. The uplift connection requirements are based upon wind loading on end zones as defined in Figure 6-2 of ASCE 7. Connection loads for connections located a distance of 20 percent of the least horizontal dimensions of the building from the corner of the building are permitted to be reduced by multiplying the table connection value by 0.7 and multiplying the overhang load by 0.8.
- f. For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced by 100 pounds for each full wall above. (For example, if a 500-pound rated connector is used on the roof framing, a 400-pound rated connector is permitted at the next floor level down.)
- g. Interpolation is permitted for intermediate values of basic wind speeds and roof spans.
- h. The rated capacity of approved tie-down devices is permitted to include up to a 60-percent increase for wind effects where allowed by material specifications.

i. V_{eff} is given by Figure 1609.1.1.1." [Eff **APR 16 2010**]
(Auth: HRS §107-29) (Imp: HRS §§107-24, 107-25)

S3-180-54 Appendix X - Hawaii provisions for indigenous Hawaiian architecture structures. Appendix X is added to read as follows:

"APPENDIX X

Hawaii Provisions For Indigenous Hawaiian Architecture Structures

Section X101 General.

X101.1 Scope. The provisions of this appendix shall apply exclusively to Indigenous Hawaiian Architecture Structures. The purpose of these provisions is to acknowledge and establish procedures for designing and constructing indigenous Hawaiian architecture structures.

X101.2 Publications incorporated by reference. The following publications are incorporated by reference and made a part of these provisions. Where there is a conflict between Appendix X and the referenced documents, Appendix X shall prevail.

1. "Hawaiian Thatched House" (1971), by Russell A. Apple, published by the United States Department of the Interior,
2. "Hale Construction Standards" (2000), by Francis Sinenci and Bill Sides,
3. "The Hawaiian Grass House in Bishop Museum" (1988), by Catherine C. Summers, and
4. "Arts and Crafts of Hawaii", Section II, Houses (1957) by Te Rangi Hiroa (Peter H. Buck)

X101.3 Definitions. For purposes of this appendix, the following words and terms shall have the meanings shown herein. Refer to Chapter 2 for general definitions.

CERTIFIED HALE BUILDER. means a person who has obtained a certificate of completion for satisfactorily completing a course in Hawaiian hale construction from the University of Hawaii, or any of its community colleges, or as approved by the Building Official.

GROUP OF STRUCTURES. A group of indigenous Hawaiian architecture structures that are in close proximity to each other and have an aggregate floor area of 1,800 square feet or less.

INDIGENOUS HAWAIIAN ARCHITECTURE STRUCTURE or HALE. A structure that is consistent with the design, construction

methods and uses of structures built by Hawaiians in the 1800's, which uses natural materials found in the Hawaiian islands, and complies with this appendix and references.

SEPARATION. The clear distance between two structures.

SETBACK. The clear distance between a structure and a property line.

Section X201 Material requirements.

X201.1 Hale materials. Hale shall be constructed using only materials grown and harvested in the State of Hawaii.

X201.2 Wood framing material. The wood members for the hale, such as posts and rafters, shall be, but not limited to hardwoods of unmilled, straight sections of trunks or branches of the following species:

1. Casaurina equisetifolia (ironwood).
2. Prosopis-allid (kiawe).
3. Eucalyptus robusta (eucalyptus).
4. Psidium cattleianum (strawberry guava).
5. Metrosideros polymorpha (ohia).
6. Rizophora mangle (mangrove).

Exception: Ardisia elliptica (inkberry) may be used only for roof purlins as an alternative to specified woods listed in Items 1 through 6.

X201.3 Roofing and siding. Thatched roofing and siding materials for the hale may be any grass or leaf material grown and harvested in the State of Hawaii, to include but not be limited to pili, kualohia, pueo, kawelu, sugarcane leaves, and ti leaves.

X201.4 Cord. Natural or synthetic cord used for lashing structural members of the hale shall be 400 pound test. Cord used for tying floating purlins and thatched materials shall be 100 pound test. All cord used on the hale shall be shades of green, tan, brown or black.

X201.5 Metal prohibited. Metal shall not be used for the construction of the hale.

Section X202 Size and location.

X202.1 Height and size limitation. Hale shall be one-story, detached structure not exceeding 1,800 square feet. Hale shall not exceed the size indicated in Table X202.1.

Table X202.1
Maximum Size of Hale (feet)

Hale Halawai	Hale Ku'ai	Hale Noa	Hale Wa'a
30 X 60	14 X 20	14 X 24	30 X 60

X202.2 Zoning requirements. Hale shall comply with minimum yard requirements in the zoning codes.

X202.3 Minimum separation. The minimum separation between a hale and another structure shall be at least 10 feet for a one-story structure; 15 feet for a two-story structure; or a distance equal to the height of the hale, whichever is more. The minimum separation between two hale shall be at least 10 feet or a distance equal to the height of the taller hale.

X202.4 Hale Noa. Hale noa structures may only be constructed on property where a separate residence exists on the property.

Section X203 Allowable and prohibited uses.

X203.1 Allowable uses. To the extent permitted by other applicable law, allowable uses for hale structures shall be in accordance with Table X203.1.

Table X203.1
Allowable Use for Each Hale Type

Use	Hale Halawai	Hale Ku'ai	Hale Noa	Hale Wa'a
Eating (ai)	Allowed	Allowed	Not permitted	Allowed
Assembling (halawai)	Allowed	Allowed	Not permitted	Allowed
Sleeping (moe)	Not permitted	Not permitted	Allowed	Not permitted
Retailing (e.g., fruits) (ku'ai)	Allowed	Allowed	Not permitted	Allowed
Storage (papa'a)	Not permitted	Allowed	Not permitted	Allowed

X203.2 Prohibited uses and activities. The following uses and activities shall be prohibited from occurring within or near the hale:

1. Cooking.
2. Open flames.
3. Generators.
4. Extension cords.
5. Electrical switches, fixtures, or outlets.
6. Plumbing faucets, fixtures, or drains.
7. Power tools.
8. No screen, mesh, plastic or any other similar material shall be attached to the hale.
9. Hale shall not be used as a food establishment as defined in the administrative rules adopted by the state department of health.

X203.3 Maintenance. The hale shall be maintained by the owner to ensure structural integrity. Repairs for

maintenance of the hale shall not require additional building permits.

Section X301 Fire protection.

X301.1 Fire protection classifications. Fire protection for Indigenous Hawaiian architecture structures shall be as required in Table X301.1.

**Table X301.1
Fire Protection Requirements Based on Setback**

Class	Setback Requirements	Fire Protection Requirements
A	<p>The structure (or a group of structures) is:</p> <ol style="list-style-type: none"> 1. Located at least 100 feet from any existing structure on the same or neighboring properties; and 2. Located at least 100 feet from any property line, except as follows: <ol style="list-style-type: none"> a. If the property line abuts a public way, the 100 feet minimum setback for that property line shall be reduced by the width of the public way, b. If the property line abuts the shoreline, the minimum setback for that property line shall be the shoreline setback, or c. For any hale ku'ai in the agricultural district that is less than 200 square feet, that is completely open on three sides, and that is used as an agricultural products' stand and if the property line abuts a public way, the minimum setback for that property line shall be 15 feet. 	No fire protection is required for the structure.
B	The structure (or a group of structures) that conforms to applicable zoning setback requirements but does not satisfy Class A setback requirements.	Automatic fire sprinkler system shall be installed in accordance with design standards in Section X301.2. An electrical permit is required for fire sprinklers systems.

X301.2 Automatic fire sprinklers. The design standards for automatic fire sprinklers for Class B indigenous Hawaiian architecture structures shall be in accordance with NFPA 13.

Exception: The design standards for automatic fire sprinklers for Class B indigenous Hawaiian architecture

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structures shall be permitted as follows:

1. 18 gallons per minute for a single head at 140 square feet maximum coverage of roof area.
2. 13 gallons per minute for each subsequent head at 140 square feet maximum coverage of roof area per head.
3. The minimum supply pressure at the base of the riser shall not be less than 40 pounds per square inch.
4. The minimum residual pressure at the highest sprinkler shall be not less than 12 pounds per square inch.
5. Sprinkler head spacing shall not exceed 14 feet.
6. Sprinkler heads shall be open type upright, pendent, or sidewall with 1/2-inch or 17/32-inch orifice and have a wax corrosion resistant coating.
7. The total number of sprinklers on a branch shall not exceed 6 heads.
8. The total number of sprinklers shall not exceed the quantity shown in Table X301.2(a).

Table X301.2(a)
Total Number of Fire Sprinklers Based on Pipe Size

Piping Size	Number of Sprinklers
1 inch diameter	2 sprinklers
1¼ inch diameter	3 sprinklers
1½ inch diameter	5 sprinklers
2 inch diameter	10 sprinklers
2½ inch diameter	30 sprinklers
3 inch diameter	60 sprinklers

9. The pipe schedule table in Item 8 shall not apply to hydraulically designed systems.
10. The water density shall not be less than 0.10 gpm per square foot.
11. The source of water may be by domestic water meters, detector check meter, underground well, storage tank, swimming pool, ponds, etc., but must meet the design requirements for adequate pressure and duration.
12. Water supply shall be sufficient to provide 30 minutes duration.
13. If domestic water meters are used as the source of water for the fire sprinklers, without a storage

tank and booster pump, the maximum number of sprinklers shall not exceed the number shown in Table X301.2(b).

Table X301.2(b)
Total Number of Fire Sprinklers Based on Water Meter Size

Size of Water Meter	Number of Sprinklers
5/8 inch water meter	1 sprinkler
¾ inch water meter	2 sprinklers
1 inch water meter	3 sprinklers
1½ inch water meter	7 sprinklers
2 inch water meter	11 sprinklers
3 inch water meter	27 sprinklers

14. The piping material shall be hard drawn copper with silver solder or brazed fittings, or carbon steel with corrosion-resistant coatings. Plastic pipes shall not be allowed, except for below grade supply pipes.
15. Fire sprinkler system shall be actuated by smoke detectors located at the highest points of the roof and spaced as recommended by the manufacturer.
16. Flow control valves shall be either hydraulically or electrically operated with a manual override switch.
17. Where the width of a roof exceeds the width allowed for one row of sprinklers, two or more rows of sprinklers shall be placed such that the entire roof area is protected.
18. Prevailing wind direction shall be considered in the placement of sprinklers.
19. Deflectors for sprinklers shall be parallel with the roof surface or tilted slightly towards the peak of the roof.
20. Fire sprinklers system shall have a local alarm activated by a smoke detector.

X301.3 Certification of water supply. For any hale that requires fire protection pursuant to X301.1, the applicant shall provide a certification from a licensed engineer or a licensed C-20 contractor that the water supply for the fire sprinkler system has been tested and is capable of delivering the required fire flow for 30 minutes duration.

X302 Smoke alarm. Any hale used for sleeping shall have an approved battery operated smoke alarm installed in

the hale.

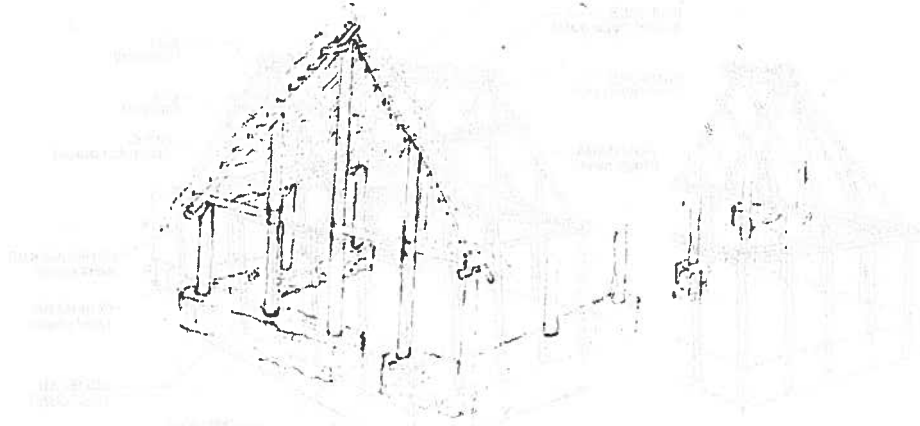
Section X401 Design standards.

X401.1 General design standards. All types of hale shall be designed and constructed in accordance with the standards set out in this section.

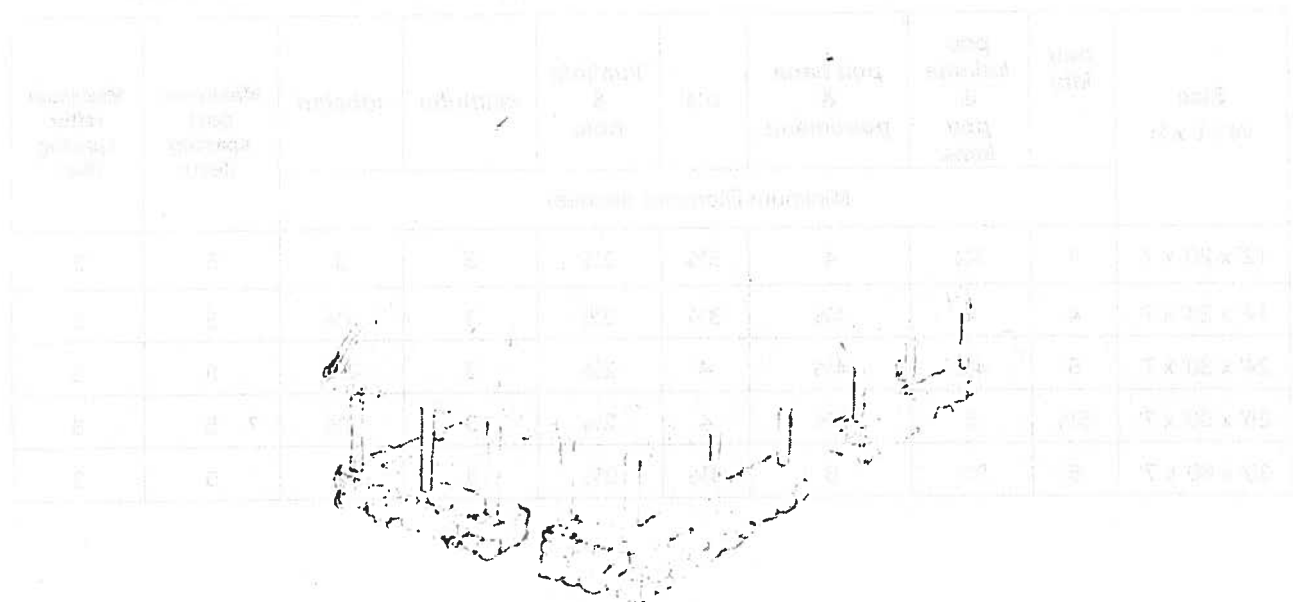
1. The minimum diameter size of all structural members shall be measured at the member's midpoint, except that the minimum diameter size of posts shall be measured at the smaller end. For structure sizes not specifically shown in the tables, the requirements in the next larger width size shall be applicable.
2. The specifications for structural members were estimated based on no wind loads. Hale shall be constructed to allow all thatching materials to separate from the structure prior to adding significant loads.
3. The mix formula for mortar specified in these rules shall be one part portland cement, four parts clean sand, and sufficient fresh water to make the mixture workable.
4. Every hale, except hale noa, shall have at least two sides completely open.
5. Lashing and thatching methods shall comply with illustrations found in "Arts and Crafts of Hawaii" or "The Hawaiian Grass House in Bishop Museum" referenced in Section X101.2.

X402 Allowable designs. Hale shall be designed and constructed in accordance with the requirements in Sections 402.1 through 402.4.

X402.1 Hale Halawai. Each end of the hale halawai may be open or thatched. The ends may also be constructed with a thatched roof hip as an alternate design. Hale Halawai shall be designed in accordance with the following schematics and illustrations. Structural components for Hale Halawai shall meet the size and spacing requirements in Table X402.1(a). Foundations for Hale Halawai shall be designed in accordance with Table X402.1(b).



HALE HALAWAI
Open End Style



HALE HALAWAI
Thatched End Style

FRAMING SCHEMATIC

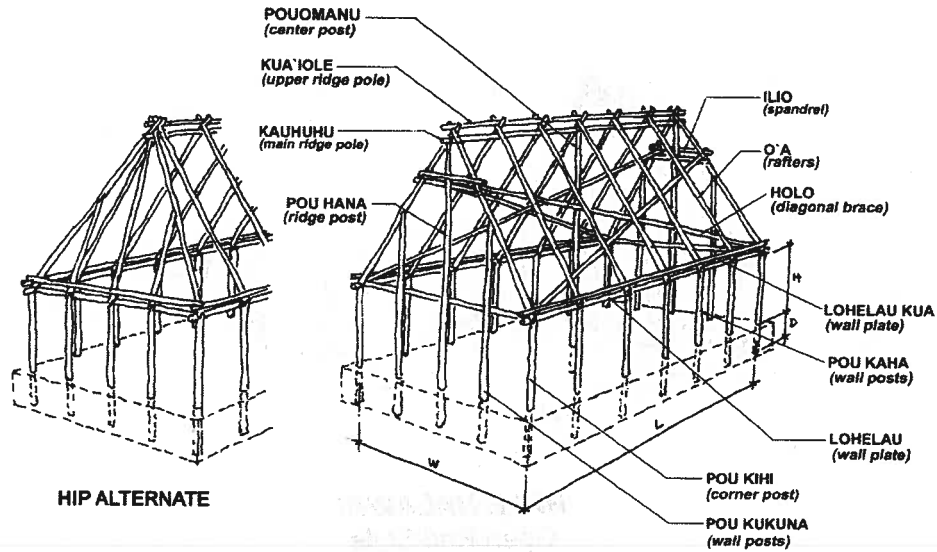
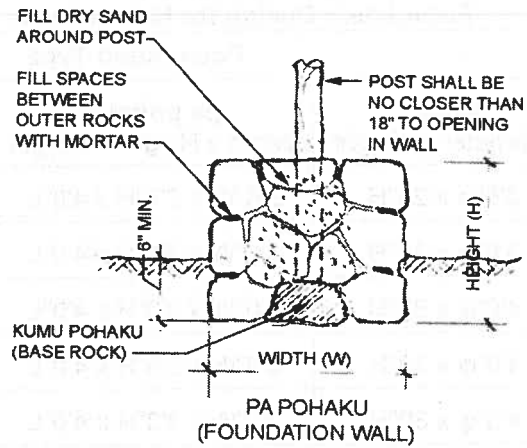
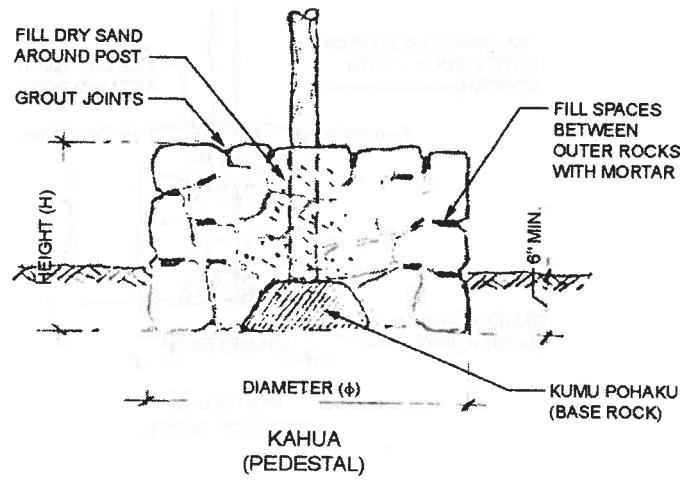


Table X402.1(a)
Size and Spacing Requirements for Structural Components used in Hale Halawai

Size W x L x H	<i>pou kihi</i>	<i>pou kukuna & pou kaha</i>	<i>pou hana & pouomanu</i>	<i>o'a</i>	<i>kua'iole & holo</i>	<i>kauhuhu</i>	<i>lohelau</i>	Maximum post spacing (feet)	Maximum rafter spacing (feet)
	Minimum Diameter (inches)								
12' x 20' x 7'	4	3½	4	3½	2½	3	3	5	3
14' x 24' x 7'	4	4	4½	3½	2½	3	3½	5	3
24' x 30' x 7'	5	4½	4½	4	2½	3	3½	5	3
25' x 50' x 7'	5½	5	5½	4	2½	3	3½	5	3
30' x 60' x 7'	6	5½	6	4½	2½	3	4	5	3



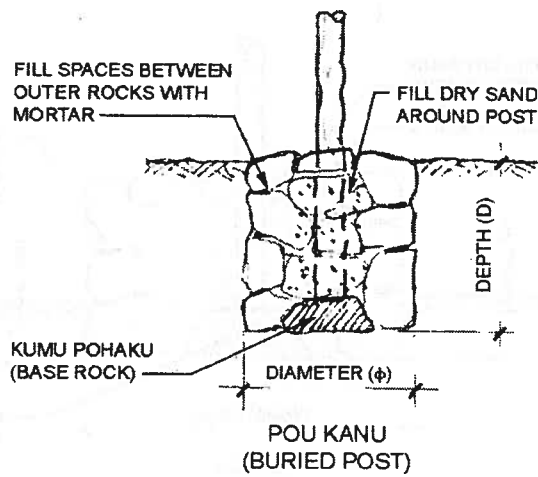
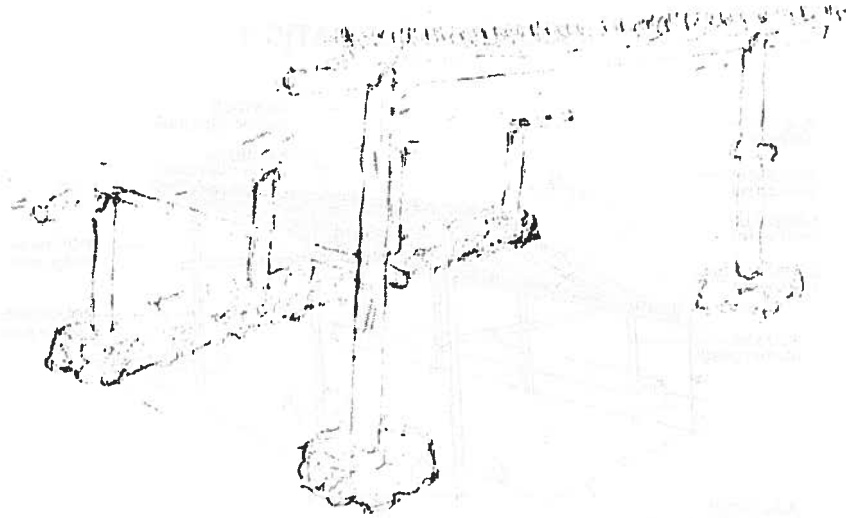


Table X402.1(b)
Foundation Design for Hale Halawai

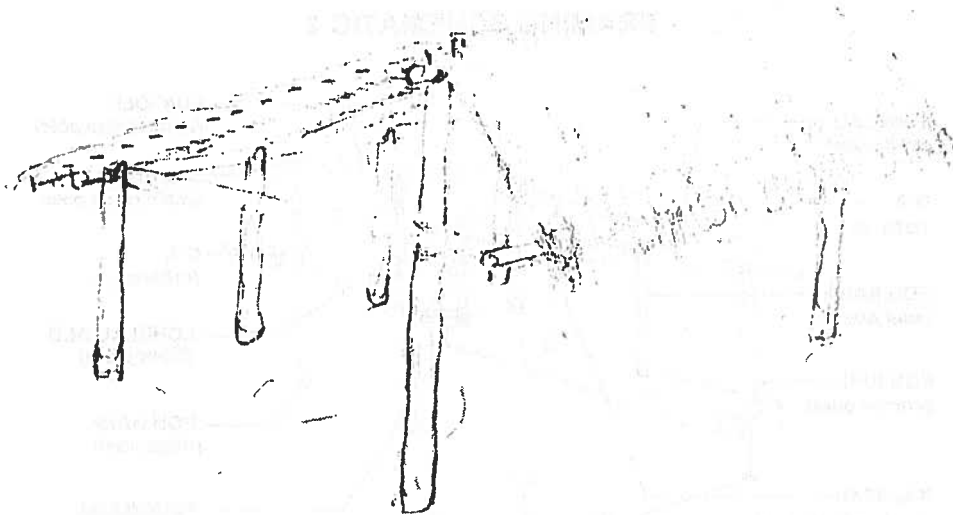
Size (W x L x H)	Foundation Type		
	kahua Diameter x Height	pa pohaku Width x Height x Length	pou kanu Diameter x Depth
12' x 20' x 7'	3'6"φ x 24"H	2'6"W x 2'8"H x 4'0"L	30"φ x 2'8"D
14' x 24' x 7'	3'8"φ x 24"H	2'6"W x 2'8"H x 4'0"L	30"φ x 2'9"D
24' x 30' x 7'	4'0"φ x 30"H	3'0"W x 3'0"H x 4'0"L	36"φ x 3'0"D
25' x 50' x 7'	4'0"φ x 30"H	3'0"W x 3'0"H x 4'0"L	36"φ x 3'0"D
30' x 60' x 7'	4'0"φ x 30"H	3'0"W x 3'3"H x 4'0"L	36"φ x 3'3"D

X402.2 Hale Ku'ai. Hale Ku'ai shall be designed in accordance with the following schematics and illustrations. Structural components for Hale Ku'ai shall meet the size and spacing requirements in Table X402.2(a). Foundations for Hale Ku'ai shall be designed in accordance with Table X402.2(b).

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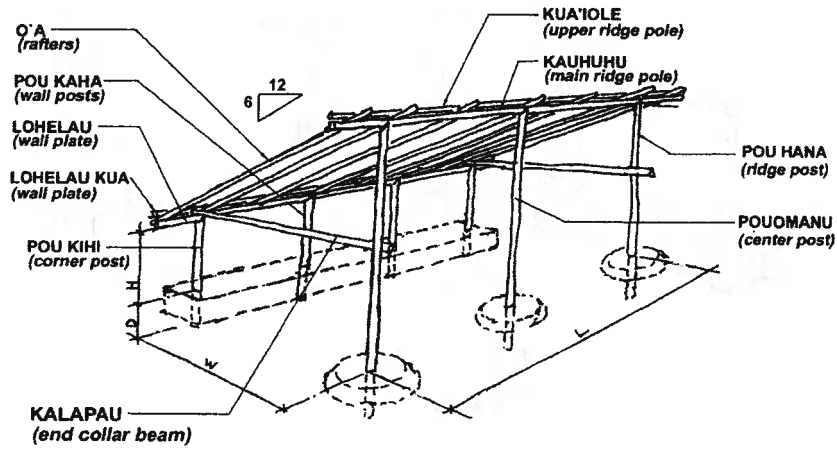


HALE KU'AI
SHED STYLE



HALE KU'AI
GABLE STYLE

FRAMING SCHEMATIC 1



FRAMING SCHEMATIC 2

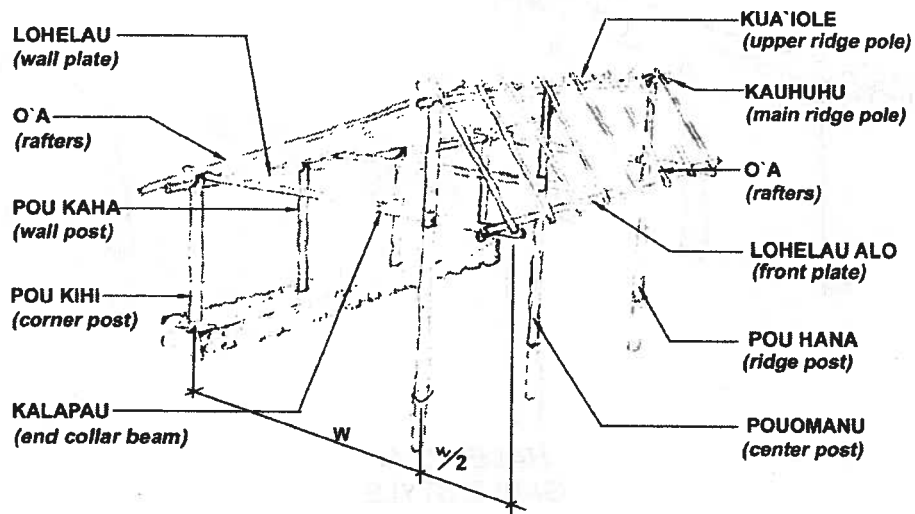
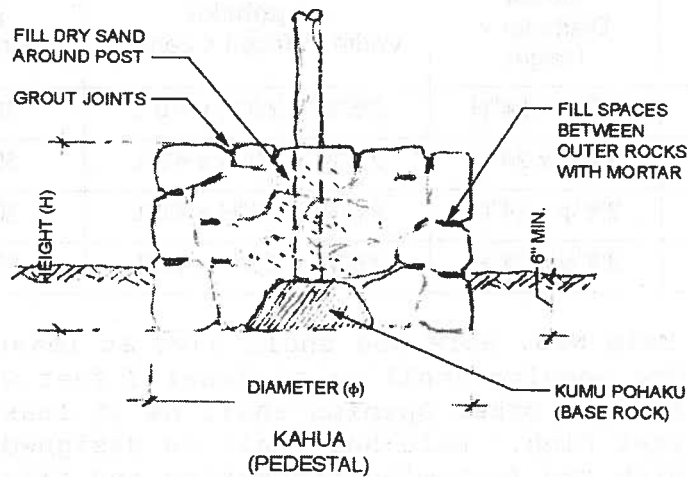


Table X402.2(a)
Size and Spacing Requirements for Structural Components used in Hale Ku'ai

Size (W x L x H)	<i>pou kihi^a</i>	<i>pou kaha^a</i>	<i>pou hana^b</i>	<i>pouo manu^b</i>	<i>o'a</i>	<i>kua'i'ole & holo</i>	<i>kauhuhu</i>	<i>lohelau</i>	Maximum rafter spacing (feet)
	Minimum Diameter (inches)								
5' x 10' x 5'	4	3	3	4	3	2	3	2	4
9' x 12' x 5'	4	3	3	4	3	2	3½	2	4
12' x 16' x 5'	4½	3½	4	4	3½	2	4	2½	4
14' x 20' x 5'	4½	3½	4	4	3½	2½	4½	2½	4

^a The maximum post spacing for pou kihi and pou kaha is five feet.

^b The maximum post spacing for pou hana and pouomanu is twelve feet.



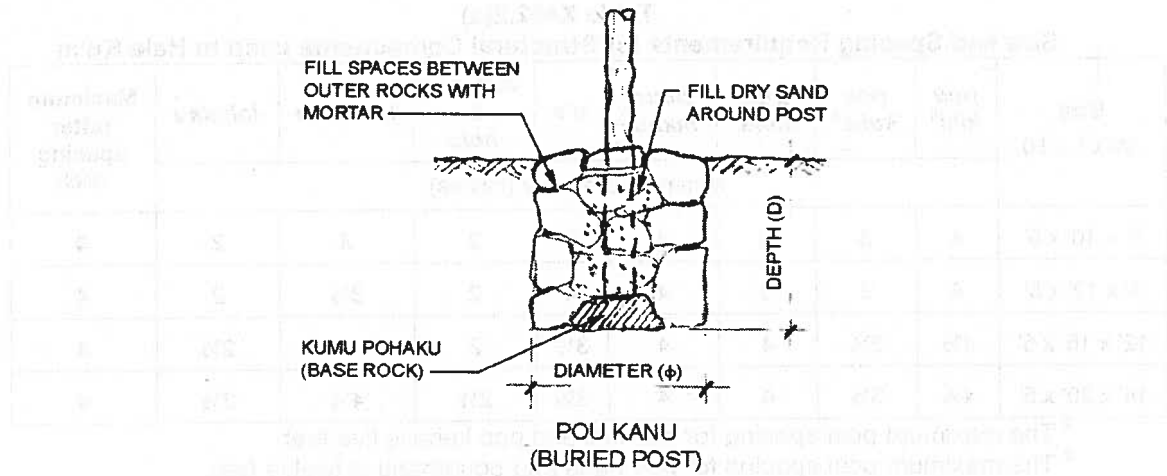
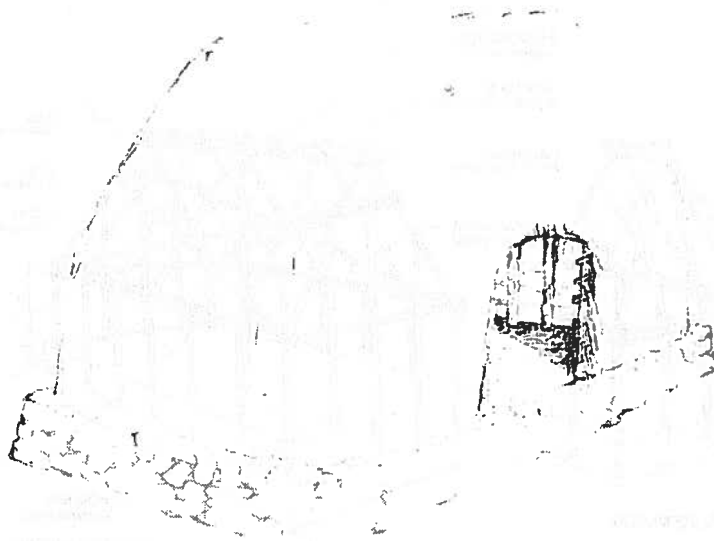


Table X402.2(b)
Foundation Design for Hale Ku'ai

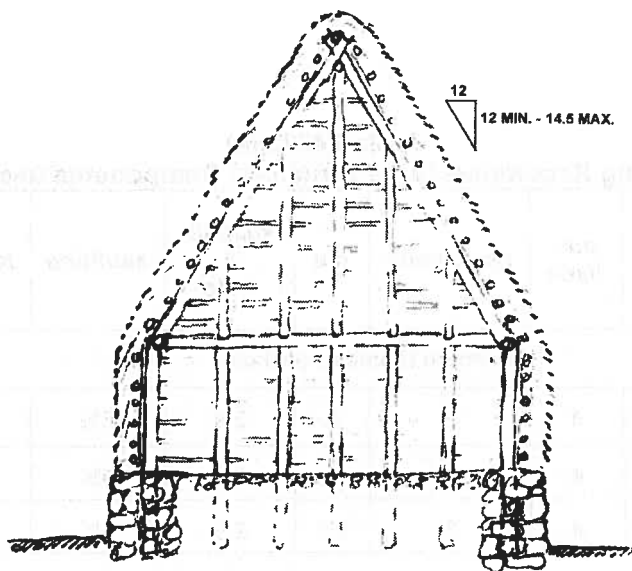
Size (W x L x H)	Foundation Type		
	kahua Diameter x Height	pa pohaku Width x Height x Length	pou kanu Diameter x Depth
5' x 10' x 5'	3'0"φ x 24"H	2'6"W x 2'0"H x 4'0"L	30"φ x 2'6"D
9' x 12' x 5'	3'4"φ x 24"H	2'6"W x 2'0"H x 4'0"L	30"φ x 2'6"D
12' x 16' x 5'	3'6"φ x 24"H	2'6"W x 2'8"H x 4'0"L	30"φ x 2'8"D
14' x 20' x 5'	3'8"φ x 24"H	2'6"W x 2'8"H x 4'0"L	30"φ x 2'9"D

402.3 Hale Noa. Hale Noa shall have at least two openings. One opening shall be at least 3 feet wide and 5 feet high, and the other opening shall be at least 2 feet wide and 3 feet high. Hale Noa shall be designed in accordance with the following schematics and illustrations. Structural components for Hale Noa shall meet the size and spacing requirements in Table X402.3(a). Foundations for Hale Noa shall be designed in accordance with Table X402.3(b).

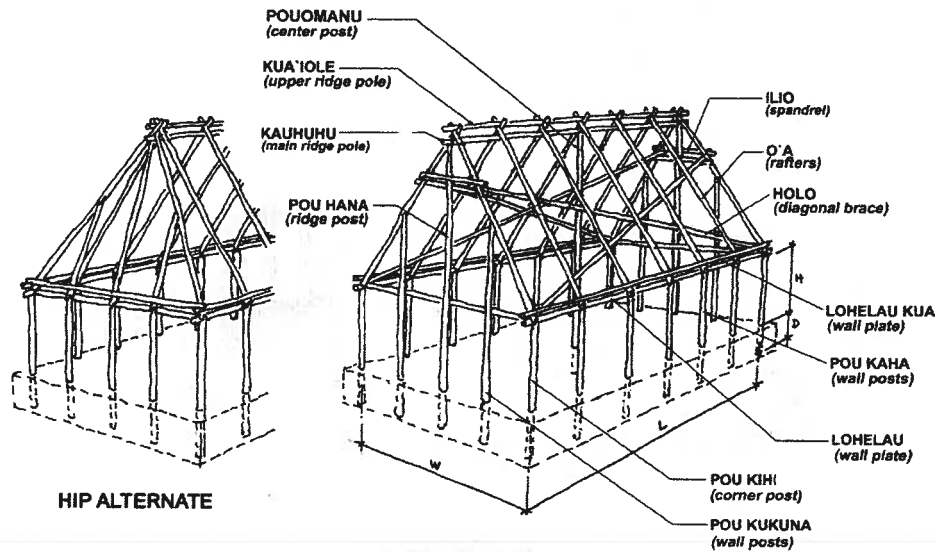
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HALE NOA



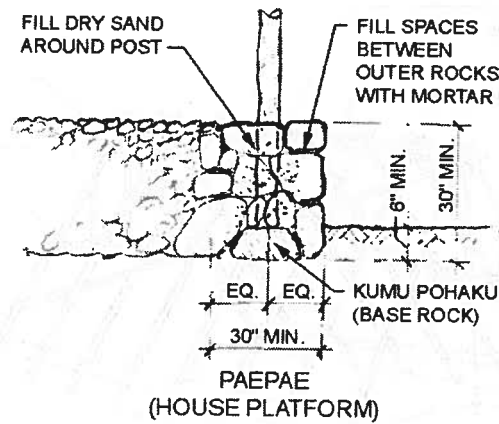
SECTION VIEW



FRAMING SCHEMATIC

Table X402.3(a)
Size and Spacing Requirements for Structural Components used in Hale Noa

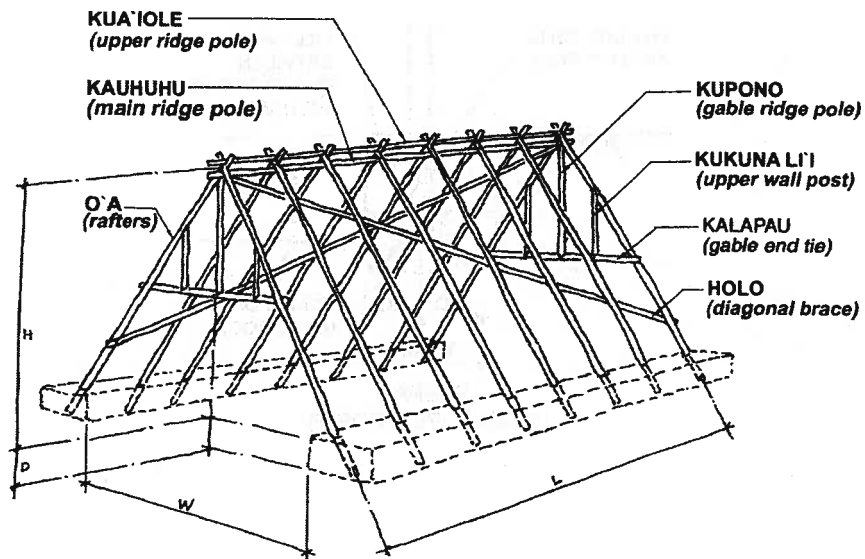
Size W x L x H	<i>pou kihi</i>	<i>pou kukuna & pou kaha</i>	<i>pou hana</i>	<i>pouomanu</i>	<i>o'a</i>	<i>kua'iole & holo</i>	<i>kauhuahu</i>	<i>lohelau</i>	Maximum post spacing (feet)	Maximum rafter spacing (feet)
Minimum Diameter (inches)										
9' x 12' x 7'	3½	3	4	3	3	2½	3½	2½	6	4
12' x 20' x 7'	4	4½	4	3	3½	2½	3½	2½	6	4
4' x 24' x 7'	5½	4½	4	3	3½	2½	3½	3	6	4



402.4 Hale Wa`a. Hale Wa`a shall be designed in accordance with the following schematics and illustrations. Structural components for Hale Wa`a shall meet the size and spacing requirements in Table X402.4.



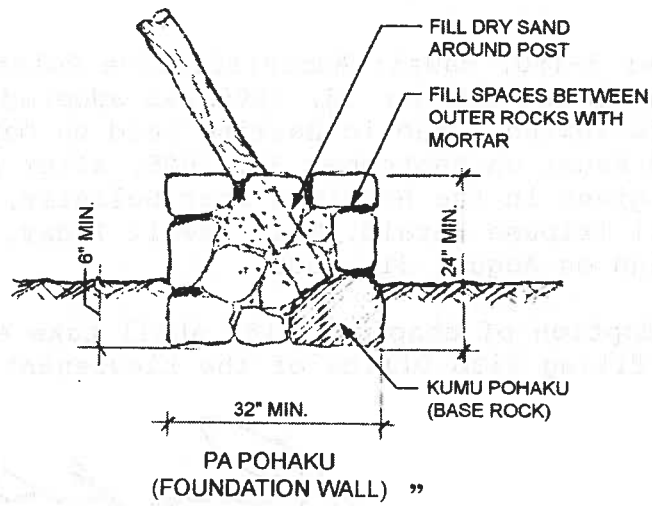
HALE WA`A



FRAMING SCHEMATIC

Table X402.4
Size and Spacing Requirements for Structural Components used in Hale Wa'a

Size (W x L)	o'a	kua'iole & holo	kauhuhu	Spacing between Rafters	Minimum Ridge Height (H)
20' x 60'	4"	3"	4"	4' to 5'	22½'
25' x 60'	5"	3"	4"	4' to 5'	27½'
30' x 60'	5½"	3"	4"	4' to 5'	27½'

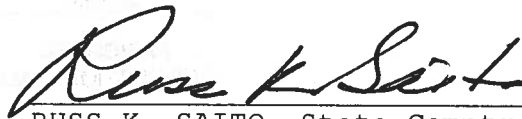


[Eff **APR 16 2010**] (Auth: HRS S107-29) (Imp: HRS
SS107-24, 107-25)

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

Chapter 3-180, Hawaii Administrative Rules, on the Summary Page dated October 13, 2009 was adopted on October 13, 2009, following a public hearing held on Oahu, Maui, Hawaii, and Kauai on September 30, 2009, after public notice was given in the Honolulu Star Bulletin, The Maui News, Hawaii Tribune Herald, West Hawaii Today, and The Garden Island on August 31, 2009.

The adoption of chapter 3-180 shall take effect ten days after filing with Office of the Lieutenant Governor.



RUSS K. SAITO, State Comptroller
Department of Accounting and
General Services and
Chairperson, State Building
Code Council

APPROVED:



LINDA LINGLE, Governor
State of Hawaii

Dated: 4/4/10

APPROVED AS TO FORM:



Deputy Attorney General

Filed